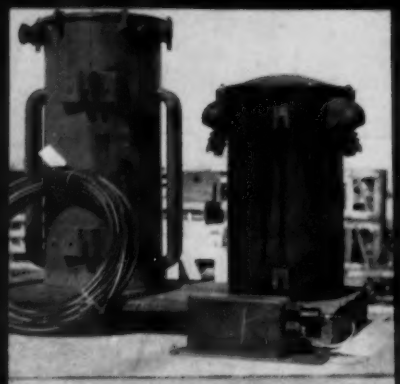

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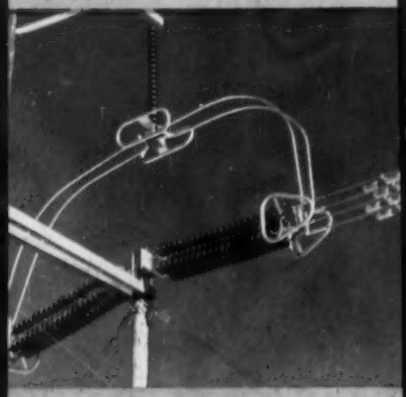

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ELECTRICAL WEST

March 1957
25 Cents

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.

Model Kitchens Help Sell Complete Installations 107

Regional Roundup 14

Expanded Over Two Times on the Same Lot 91

Tells LBE Success Story 106

Face the Facts of Life 122

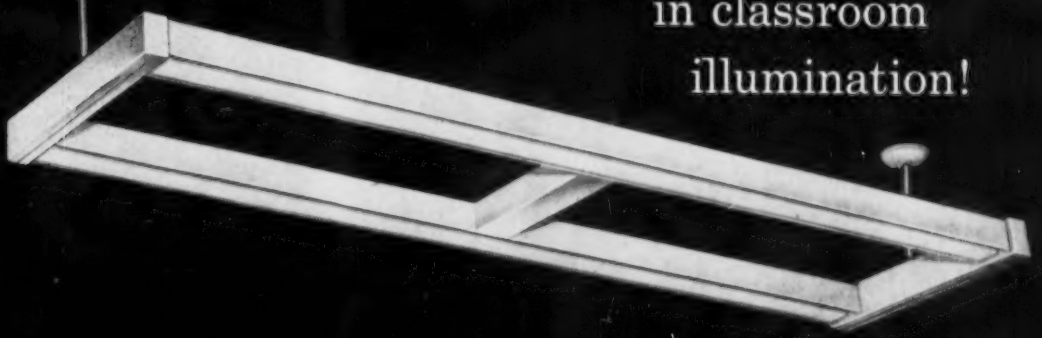
News of the Industry 141

The Sales Record 101

Flameless electric cooking
keeps more juice in the meat
In roasting, juice is the secret of flavor—and flame is the enemy of juice
Here's why:
◊ Flame needs air to breathe. A flame-heated oven constantly inhales dry air, exhales moist air—literally cooks meat in a hot draft that evaporates good juices. And what is more disappointing than a fine roast without all its flavorful juice?
But when you cook it electrically, there's no draft of constantly changing air. Because there's no flame. You cook in moist, not dry heat. Result? More juice stays in the meat . . . and it tastes better.
◊ And electric cooking is cleaner. Keeps your pots, pans and walls fresh and new. It's far cooler, too. Electricity puts the heat in the food, not in the kitchen. It's fast and automatic. Truly, electricity is the only modern way to cook. See your electrical appliance dealer soon.
Flame
Electric
LIVE BETTER—ELECTRICALLY
SOUTHERN CALIFORNIA Edison COMPANY
Did you know? Flameless electric cooking costs about $1.30 to $1.50 a month for a family of 4

Edison is selling the advantages of electric cooking— to boost your electric range sales

PERFECT VISION... a new look in classroom illumination!



ideal for new construction or relighting jobs

Here is Smoot-Holman's incomparable new high output indirect luminaire for schools. Meets all A.S.A. requirements.

- LESS TENSION
- MORE EYE COMFORT
- DEEPER KNOWLEDGE PENETRATION

With the new 800 MA lamps, Perfect Vision will return more light—better light—per dollar than ever thought possible.

Contact your local Smoot-Holman lighting engineer or write direct for catalog PV-288

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We support the National Lighting Bureau.

service in the west and southwest for all school, commercial and industrial lighting

ELECTRICAL WEST

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.

THE ALL-INDUSTRY MAGAZINE OF PROGRESS, ESTABLISHED 1887,
and incorporating the "Electrical Journal," "Journal of Electricity, Power and Gas" and "Journal of Electricity."

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Next Month

Among the features in the April Industrial Issue will be an article on the reasons for the Yuma Axis plant; a selection guide for d-c rectifiers; articles on d-c testing practices and the electrical side of rapid transit. The issue also will have the Roundup and the regular news features, as well as market development features.

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High-Voltage Pin-Type Insulator. This and all other Illinois insulators are available with radio and TV noise-proof glaze in standard production.

TRIPLE-TESTED
To Assure Top Quality

At Illinois Electric Porcelain Co. the manufacture of electric porcelain is no longer an art or simply a skilled craft. New standards of material testing, manufacturing controls, and rigid final tests have made porcelain manufacturing a scientific production procedure.

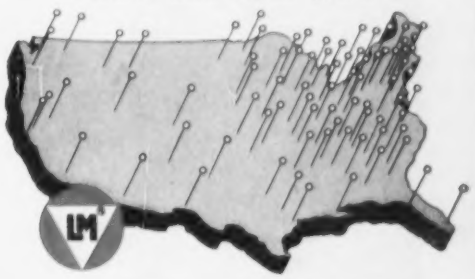
By triple-testing as set up by Illinois, we mean: (1) incoming materials are tested in a new, complete ceramics laboratory; (2) quality control during manufacturing assures uniformity and compliance with high standards in molding, pressing, drying, glazing, and firing processes; (3) rigid mechanical and electrical tests to destruction are made on a representative quantity of the finished product. The result is a product the user of Illinois porcelain can depend on for uniformity, consistently high strength and insulating value.

The high-voltage pin-type insulator shown is available in EEI-NEMA ratings 56-1, 2, 3, 4 for 23, 34.5, 46 and 55 kv with radio noise-proof glaze as standard.

Illinois Electric Porcelain products include pin and suspension insulators, strain insulators, switch and bus insulators, hardware and fittings.

For fast service, just pick up the phone now and call your nearest L-M office. Or ask your L-M Field Engineer for complete information and a copy of Bulletin DL8; or write Line Material Company, Milwaukee 1, Wisconsin.

67 L-M Warehouses... there's one near you!

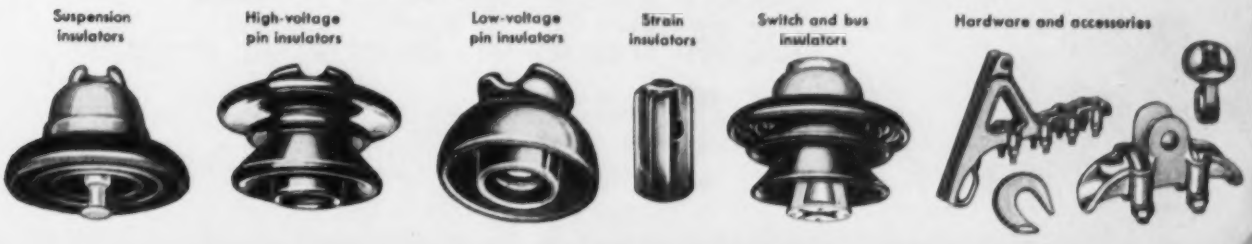


ILLINOIS ELECTRIC PORCELAIN COMPANY
(a McGraw Electric Company Subsidiary) Macomb, Illinois

Distributed by **LINE MATERIAL** Electrical Porcelain Insulators
A McGRAW ELECTRIC COMPANY DIVISION

285

L-M offers an extensive line of suspension and strain insulators, and hardware accessories



Conductor Clamps

Lamp Lead Brackets

"Hub-Rak" Secondary Racks

Thimbles

Insulated Clevises

Guy Protector

Pole Markers

Underground Racks & Hooks

Anchor Rod Bounding Clamps

HUBBARD aluminum hardware cuts corrosion costs

If you are faced with mounting corrosion costs in your service area, it will pay you to investigate Hubbard Aluminum Pole Line Hardware. This constantly growing line of hardware items was especially developed for application in corrosive atmosphere. To accomplish this, Hubbard combined the corrosion resistance, lightness and strength of special Aluminum Alloys with new fabricating techniques to produce hardware capable of long service life under extremely adverse conditions.

The special conditions of contamination in your area as well as other factors can be successfully overcome by the right choice of Pole Line Hardware Material. In addition to Aluminum Alloy, Hubbard Pole Line Hardware items are available in galvanized steel, Cor-Ten steel and special items in Copperweld steel. A Hubbard Hardware specialist will be glad to make a study of the atmospheric conditions which affect the service life of your pole line hardware in order to provide you with the type of hardware best suited to your needs.

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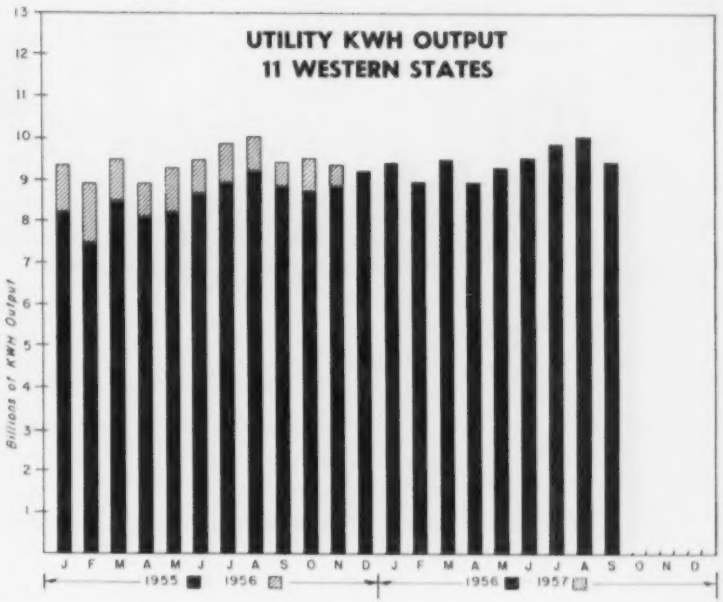
----How're We Doing?



Output Comparisons

Year-to-year Kwh Output Changes in Western Regions and U. S.
Per Cent Changes Over Same Week One Year Ago

Week Ending	Rocky Mountain	Pacific Southwest	Pacific Northwest	U. S. Total
Jan. 5	+ 9.4	+ 6.4	+ 9.9	+5.6
Jan. 12	+11.0	+ 9.9	+11.2	+6.2
Jan. 19	+19.3	+14.6	+ 7.0	+9.0
Jan. 26	+12.8	+16.8	+ 9.0	+7.0

Revenue Highlights

Western growth patterns are reflected in the monthly review statistics of the industry. For example, residential revenues in November were 10.5% ahead of November 1955, compared to the national figure of 9.7%. Western small light and power revenues on the same basis were 7.15% ahead, compared to 8.0% nationally, but large light and power buyers chalked up a 9.1% growth against the national figure of 5.2%. The intermountain area has been consistently turning in heavy gains in this class of energy sales.

NEMA Target

Electrical manufacturers confidently expect to ship $21½ billion worth of electrical products in 1957. This is a $21.9 million increase over the record set last year and represents an 11% growth in manufacturing output. Topping the list of individual categories, appliances will account for $5.15 billion in shipments; industrial apparatus, $3.21 billion; generation, transmission and distribution equipment, $2.07 billion; wire and cable, $2.02 billion with other groups making up the balance. Looks like a question of who's going to be busier in 1957, salesmen or purchasing agents.

New "Twist" in Arresters...

LONGER ARRESTER LIFE

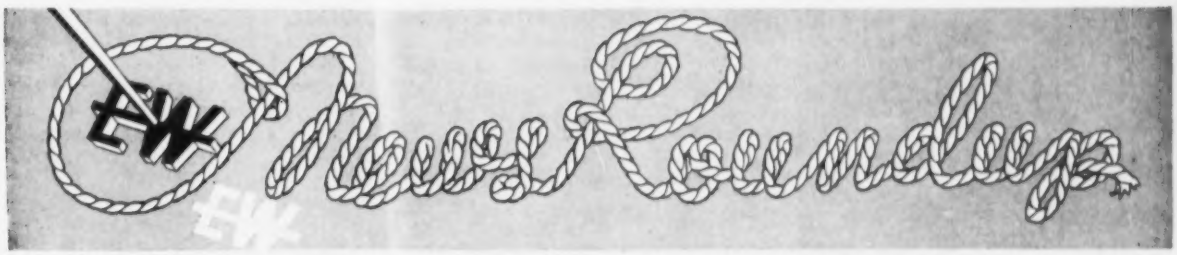
It's the Westinghouse exclusive Mobilarc gap —employing a radically polarized ceramic permanent magnet. Applying the left-hand motor law, it spins or "twists" the arc around a longer path on the gap electrodes . . . No consequential pitting or plating, even with as many as 1300 surge and follow-current discharges or with long duration surge discharges . . . No deterioration of the gap or consequent lowering of 60-cycle sparkover. Tests indicate magnet life to be infinite.

You need such performance if you follow the trend to use arresters at 75% to 80% voltage ratings—to protect transformers against long duration switching surges as well as lightning. All Westinghouse SVS, SV, and LVS station and line type arresters are equipped with Mobilarc gaps—and there is no initial investment premium. Complete engineering details and ratings are available from your Westinghouse sales representative—or from Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-60905

YOU CAN BE **SURE**...IF IT'S

Westinghouse



SIGNIFICANT ITEMS FROM THE EDITOR'S NOTEBOOKS

HELLS CANYON is getting attention from the Oregon legislature, too. The House of Representatives has approved, by a vote of 37 to 18, the idea of sending a memorial to Congress asking for funds and for immediate construction of a high dam.

The comment of Emil Stunz, Democrat representative from Nyssa, on the Snake River, was that the Federal Power Commission granted license to Idaho Power Co. after a year of hearings "by competent men."

"It seems foolish for this body, as a relatively poorly informed group, to say that FPC doesn't know what it is talking about."

The Oregon Senate may defeat the memorial since the party line split in the upper house is 15-15.

—EW—

AIEE GOES MODERN—The 1957 national telemetering conference of the AIEE is planning a radical departure from the usual verbatim reading of technical papers. Copies of each speaker's paper will be circulated before the meeting and the author will deliver a brief summation followed by a question-and-answer period at the meeting.

Sounds great.

—EW—

ADD ONE—Another large privately financed nuclear power station has been announced. Ten Midwestern utilities will sponsor a 60,000-kw, $25,000,000 plant to be built somewhere in the four-state service area of the Northern States Power Co. (Minneapolis, Minn.) and eventually become the property of that utility.

Negotiations are under way with Pioneer Engineering & Service Co. and the Allis-Chalmers Mfg. Co. as engineers and prime contractor, respectively. The atomic reactor will be of the controlled re-circulating boiling water type and is scheduled for operation in 1962.

Partnership development of the Trinity River project in California has received the blessing of Interior Secretary Fred Seaton. What Congress does with the plan remains to be seen, but at least there is no question, now, on the stand of the administration. See details in "This Month's News."

—EW—

DEFINITIONS—What is a conservative? What is a liberal? Definitions will be about as varied as definers.

The Sacramento Newsletter asked Assemblyman Harold Levering (R—Los Angeles), who was called "very conservative" by a Newsletter panel, and Sen. Richard Richards (D—Los Angeles), labeled "very liberal" by all, to define these two terms.

Levering said: "A conservative is a person dedicated to the preservation of the liberties guaranteed to the people by the Constitution of the United States."

Richards said: "A modern liberal is one who accepts progress rather than the status quo as the touchstone of social and legislative attainment. He usually feels action to be preferable to inaction. Individual freedom and group welfare are not incompatible and both superior to entrenched interest. Rather than asking if a man is of the left, center, or right, I think it would be of greater relevance to ask: Is he moving forward, or backward, or is he standing still?"

(For more on the definition of "liberal," see p 570 of the fourth edition of Webster's Collegiate Dictionary.—Ed.)

—EW—

General Electric's investment in eight Western states and Alaska increased by $17,500,000 during 1956, adding 1,600 new jobs. Pay roll for the year totaled about $100,000,000.

SECOND LOOK—Readings on the economic barometer after six weeks of 1957 still fail to show much cause for worry either for a boom or bust in the coming months.

While public acceptance of the new-model cars has been somewhat disappointing (according to Detroit standards) and the tight money situation is a depressant to housing and unbridled capital expansion, business is still good by almost any index. In fact, there are more than a few economists who feel that a mild restraint over the buoyant factors in the economy is desirable. The theory there is that boom conditions last longer and go further without excessive inflation under that condition.

—EW—

Free polio vaccine is being made available to all employees of the Pennsylvania Transformer Co. and the Public Service Co. of Colorado. These are the first notices that have come across our desk of corporate action to encourage protection from the dread malady.

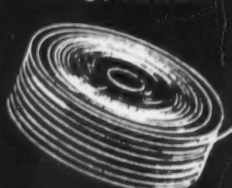
—EW—

WINNERS—The "On to Europe Contest" sponsored by General Electric's Appliance Park (for utility commercial executives heading up result-producing promotional campaigns) produced four winners. Judges selected the entries from West Penn Power from among nonmerchandising companies having over 300,000 meters.

In this same category, but for companies with under 300,000 meters, the Florida Power Corp. was judged to have done the best job.

Among the entries from companies which do merchandise, the Boston Edison Co. won top honors as did the Sacramento (Calif.) Municipal District among the entries from municipal utilities.

Prize is an all-expense trip to

SPINNING WIRE
FOR EVERYNEED
STEEL
ALUMINUM
STAINLESS STEEL
COPPER
COPPERWELD
TO FIT ANY SPINNER

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CABLE SPINNING EQUIPMENT CO.
3100 TOPEKA AVE.
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Serving the growing Independent telephone industry
OVERSEAS SALES:
Ericsson Corp. of New York
Automatic Electric of Canada
Pirelli of Great Britain

Europe for the commercial executive and his wife in company with the other three winners and an Appliance Park host couple.

—EW—

COOL – Metropolitan-Vickers, a British electrical manufacturer, has completed the installation of a 30,000-kw turboalternator at one of the stations of the Central Electricity Authority in England. The reason that this installation is news is contained in a description of the alternator that employs a water-cooled stator.

Water, flowing from an annular header pipe at one end of the stator, passes through hollow copper stator conductors to a similar header at the opposite end of the machine. Connection between the header and the conductors is made with tubes of plastic insulating material.

The manufacturer reports that tests of the design indicate that the cooling method is so effective that 150,000 kw could be obtained from a machine of the present 30,000-kw frame size.

—EW—

Factory unit sales of home laundry appliances increased 7% in 1956 over 1955. Of the 6,107,457 total home laundry units sold, automatic and semi-automatic washers accounted for more than half the total. Electric dryers outsold their gas counterparts by nearly three to one, the total of 1,601,710 dryer units being 16% over that of the previous year. Ironers continue to slump, chalking up a 29% decrease with only 81,910 units being sold during the year.

—EW—

PROMOTIONAL BROCHURE —Utah Power & Light Co. has prepared its 1957 business development program around the theme "For '57 Sell Live Better . . . *Electrically*." The program is contained in a handsome brochure which depicts the large growth potential for the West and the company's service area. It shows what can be accomplished and how the company is going to help do the job. The brochure will be used in a series of meetings with employees and other elements of the electrical industry. Bill Huckins didn't say so, but he might have an extra copy for any commercial executive who is interested.

SWITCH – The state of Washington has officially entered the camp of those who are supporting a high dam for Hells Canyon. Gov. Albert Rosellini, Democrat, reversed the official stand of his predecessor, Arthur B. Langlie, by directing Attorney General John J. O'Connell to prepare a brief for submission to the U.S. Supreme Court.

The brief will support the high dam and will be included in a high court review of a case attacking Idaho Power's licenses, if the National Hells Canyon Assn. succeeds in getting the review. An appeals court recently ruled against revoking the licenses.

—EW—

The Montana House of Representatives has passed a bill that allows charging the cost of moving utility poles on federal highway projects to the state.

—EW—

Two American Gas & Electric engineers, reporting to the AIEE, pointed out that their company had installed 7,000,000 kva of 138-kv-class transformers with two-stepdown (92 kv) insulation over the past 22 years. This practice resulted in 20% saving in weight, 25% saving in first cost, 14% decrease in kilowatt loss and 12% decrease in kvar loss.

—EW—

PREDICTION—The Federal Power Commission has looked into the crystal ball and come up with a glimpse of 1980. The prediction is that the nation's utilities will need to increase their total capacity to 386,000,000 kw to meet a load requirement of 1.8 trillion kwh. This is contrasted to the slightly more than half a trillion kwh. produced in 1955.

Also of particular interest is the statement that the greatest future rate of growth will occur in the Pacific Southwest because of contemplated industrial expansion and population growth there.

—EW—

EXCELLENT – Six Western electric utilities won the American Institute of Management rating of Excellent Management for 1956. They are: Pacific Gas and Electric Co., Arizona Public Service Co.,

Idaho Power Co., Pacific Power & Light Co., Southern California Edison Co. and Montana Power Co.

—EW—

Bob Hutchison and his friends and associates found a surprise in our January ELECTRICAL WEST. In reporting his move to S&C Electric Co.'s Western sales division as manager, we had him leaving the position of chief engineer of Federal Pacific Electric Co. Actually he was product sales manager of FPE's Pacific Switchgear Division. Thanks for correcting us, Bob.

—EW—

Chinese New Year in San Francisco had at least one innovation. The dragon used for parading had electric lights along its entire length. In the past only the eyes glowed. Live Better—Electrically is going everywhere.

—EW—

ALL CHIEFS—Denver Water Board members are businessmen from various fields who devote only part of their time to board activities. A nuisance administrative problem arising from this situation is that several members are often out of the city at the same time, and when it happened that the president and vice-president were away operations were bogged down.

The five men solved the problem by electing a president from their number who in turn appointed all the others vice-presidents.

—EW—

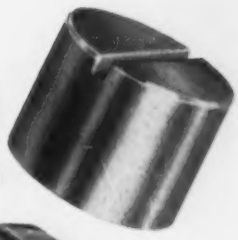
The electric sign lighting load in Scottsdale, Ariz., is destined to be nil—or else. "The West's Most Western Town" has outlawed neon, freon, translucent, flickering, intermittent or animated signs. First offense costs $100 or 30 days in the calaboose.

—EW—

COMPROMISE—The Niagara River power project probably will be built by the State of New York.

At least New York Republican congressional representatives have reached a tentative agreement on a proposed bill that would make it a state project, that would allot the Niagara Mohawk Power Corp. 445,000 kw of power (lost when its

Monarch
RENEWABLE FUSES



One dependable quality with **BETTER PROTECTION ...OVER A LONGER OPERATING PERIOD ...AT THE REGULAR FUSE PRICE**

This is the **Monarch** LONG LASTING *Renewable* ferrule type fuse

Discriminating users have specified these fuses for many years because of their QUALITY CONSTRUCTION *permitting easy access for cleaning and speedy Mon-o-lag link replacement*

Because **Monarch Fuses** are made from raw material to final inspection under our own QUALITY CONTROL—we are able to make strong claims and GUARANTEE long service.

A complete line of knife blade and ferrule type renewable and one-time fuses; plug fuses and spring clips.

Specify **Monarch Fuses** *for improved* **FUSErvice**

Monarch
ELECTRIC CORPORATION
Jamestown, New York

IT PAYS TO HAVE HUBBELL GOOD CONNECTIONS

and here's another NEW product

SOLD ONLY THROUGH AUTHORIZED ELECTRICAL WHOLESALERS

UNUSUALLY SHALLOW

GROUNDING DEVICES

Designed For Panel Mounting

The No. 5258, 125 volt, parallel slot receptacle (and its companion unit, the tandem slot 250 volt, No. 5658) is a competitive, yet very rugged, single, flush-mounted device designed for grounding exposed metal parts of portable electrical equipment. It is side wired with green grounding terminal binding post.

Each unit, when fitted with mounting flange, makes up a new female motor base, Cat. No. 5256 and No. 5656.

Male motor bases (No. 5288 and No. 5668), fitted with "U" shaped pin for grounding, are designed for use with 3-wire, grounding-type cord, connector bodies.

- Round "Shoulderless" design permits mounting in restricted spaces.
- Unusually shallow depth
- Green hexagonal grounding screw
- Rugged bakelite construction
- For use with metallic or non-metallic wiring systems

Parallel Slot 125 VOLT 15 amp.

Tandem Slot 250 VOLT 15 amp.

5258 #8-32 TAP .812" 1.390" 1.468" 1.750" 1.093"

5658

SINGLE RECEPTACLES

5256 2.062" .203" 1.093" 1.468"

5656

FEMALE MOTOR BASES

5288 1.562" .203" .593" 2.062"

5668

MALE MOTOR BASES

HARVEY HUBBELL, INC.

HIGHEST QUALITY WIRING DEVICES • MACHINE SCREWS

DEPT. R-1 BRIDGEPORT 2, CONNECTICUT

WIRING DEVICE WAREHOUSE LOCATIONS ASSURE NATIONWIDE STOCK AVAILABILITY

Bridgeport 2, Connecticut
State and Bostwick Streets

Chicago 7, Illinois
37 South Sangamon Street

Los Angeles 12, California
103 North Santa Fe Avenue

San Francisco, California
1675 Hudson Avenue

Dallas 7, Texas
1111 Dragon Street

Schoellkopf plant was partially destroyed by a rockslide last June) and that eliminates the preference clause in the marketing of power.

—EW—

The Tennessee Public Service Commission struck a blow against government preference that caused howls of protest from the federal government and the railroads. The commission merely eliminated a special preferential rate for intrastate shipments of coal to government buyers, set during the war. TVA, one of the largest users of coal now, would have to pay $1.66 per ton instead of the former special rate of 87c per ton for coal movement. If the commission can make its decision stick, the "TVA yardstick" may get just a bit longer.

—EW—

MOVIETIME PG AND E—Nearly 400,000 people viewed movies that are written, produced and photographed by the advertising and publicity department of Pacific Gas and Electric Co. in 1956. Uncounted thousands more saw the same movies on television.

The public relations success of the company-produced movies is great enough to prompt the utility to maintain a library of 57 films, 11 of them produced by the company.

Latest product of PG and E publicists is a 27-minute sound and color film entitled "Water." Jon F. Stanton, company cameraman, traveled the High Sierra for a year to collect the scenes that show the source, transportation and use of California's water resources.

-EW-

COMPETITION FOR RECRUITS—A sheepskin will mean a higher starting salary this year. At least that is the information that comes to us via the Bureau of National Affairs, reporting on information received from Frank S. Endicott, director of placement at Northwestern University.

Competition for the 1957 graduates will be tougher than ever with graduate engineers being offered a starting salary of $433 a month; graduate accountants, $389; and other liberal arts graduates, $385.

His survey among 200 companies that actively recruit on college campuses also brought out the fact that

the 1953 graduates which were hired in 1953 now average $500 a month and those of the class of 1951 have reached an average level of $575 per month. Those who have been employed 10 years are at the $775 per month level on the average.

From the standpoint of the engineer, there is a catch to these figures. The survey indicates that salary progress is slower for engineering graduates than for those who enter the field of sales, general business or accounting. The 10-year man on the sales staff hits an average high of $826 per month, while his opposite number in the engineering job only gets $740.

Significant is the fact that the firms will seek 35% more graduates with engineering and technical training and 30% more from the schools of commerce and liberal arts than they recruited last year.

—EW—

Vancouver Electrical Assn. has moved to larger offices at 706 - 509 Richards St., Vancouver, B.C.

—EW—

WESTERNERS NOMINATED—The 1957-58 slate of officers for the AIEE is headed by Walter J. Barrett, engineer for the New Jersey Bell Telephone Co. Other nominations include five vice-presidents, one of whom is Orien A. Gustafson with G-E in San Francisco, and as a director Edwin W. Morris with Westinghouse in Los Angeles.

—EW—

The House subcommittee on manpower utilization is considering the problem of manpower pirating by cost-plus defense industries.

-EW-

Ole Svensen, out of patience with his line crew, was heard to say:

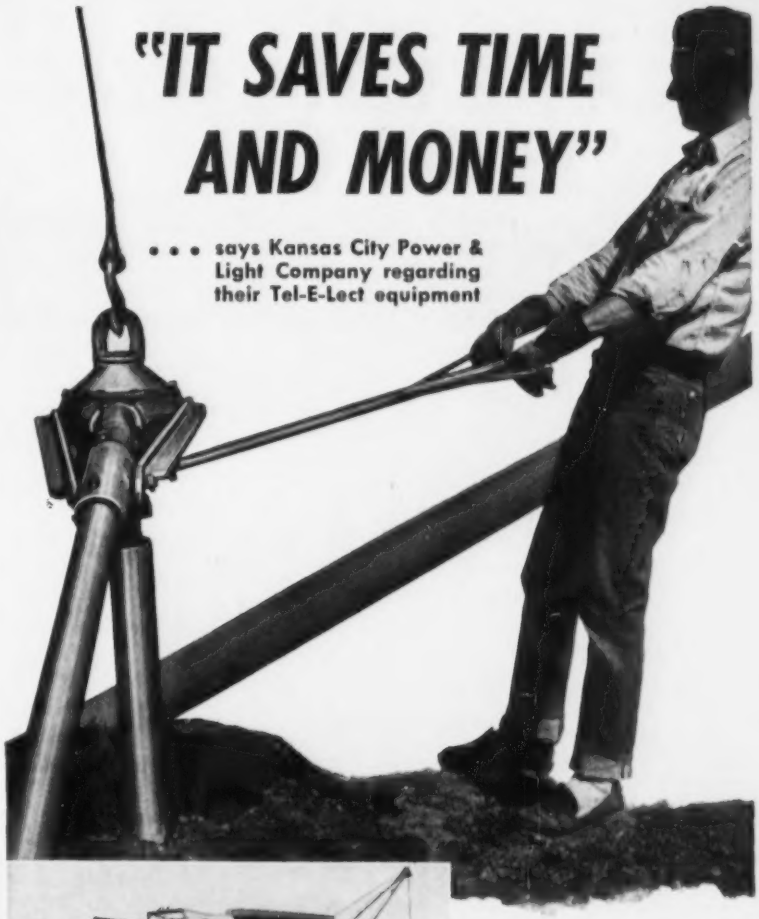
"Them lines ain't any harder to sag right on Friday afternoon than any other time. Trouble is you guys are thinking about stagging Saturday night instead of sagging Friday afternoon."

—EW—

Farnsworth Electronics Division of IT&T has announced a vacuum tube with a built-in memory—named the Iatron.

"IT SAVES TIME AND MONEY"

• • • says Kansas City Power & Light Company regarding their Tel-E-Lect equipment



Takes only a two-man crew — one man in the cab and one man on the auger.

There's a lot of action when trucks mounted with Tel-E-Lect equipment go to work for the Kansas City Power & Light Co. of Kansas City, Mo. These pictures, taken at the site of the new Farmers Underwriters Assn. building in Overland Park, Kan., show the Power Company installing lines for 3 phase power. The holes being dug vary from 6½′ to 10′ deep. The company particularly likes the fact that the Tel-E-Lect digger unit is detachable from the truck, a big convenience feature.

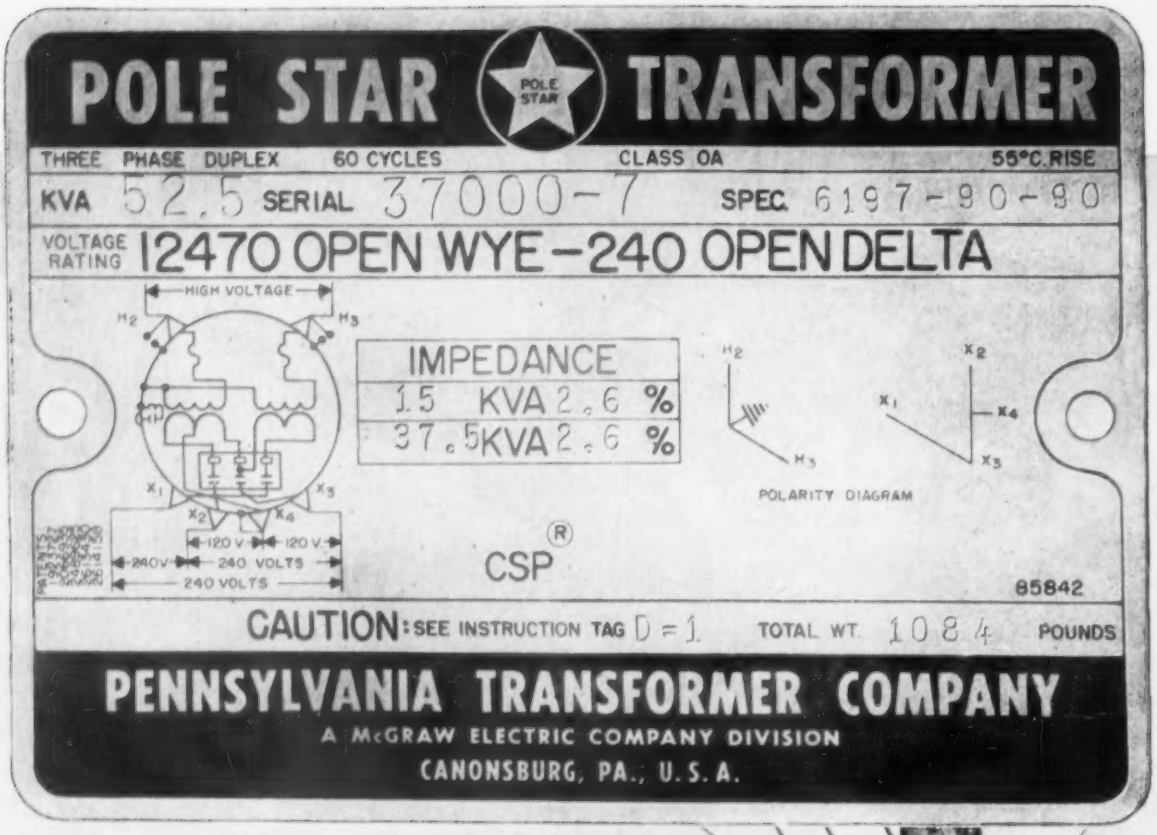
What you see in operation here is Tel-E-Lect's Popular Model 350 digger that permits a two-man crew to dig a hole and set a pole in less than five minutes. Here you have low speed for digging, high speed for throwing off the dirt. For more information about the wide range of Tel-E-Lect equipment for utility trucks, write for a complete line bulletin.

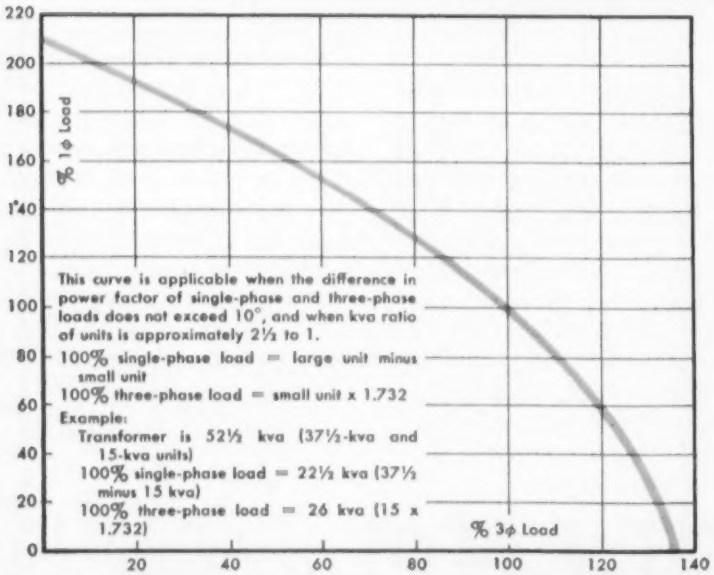
Distributors: American Equipment & Body Co., Los Angeles 21, Calif.; Utility Body Company, Oakland 7, Calif.; Douglas Hood Company, Portland 9, Ore.; Robbins Utilities Equipment Company, Seattle 4, Wash.; Utility Equipment Company, Oklahoma City 18, Okla.; Utah Truck Equipment Co., Salt Lake City 4, Utah.

TEL-E-LECT PRODUCTS, INC.

10025 Minnetonka Blvd.
Minneapolis 26, Minn.

Announcing the NEW





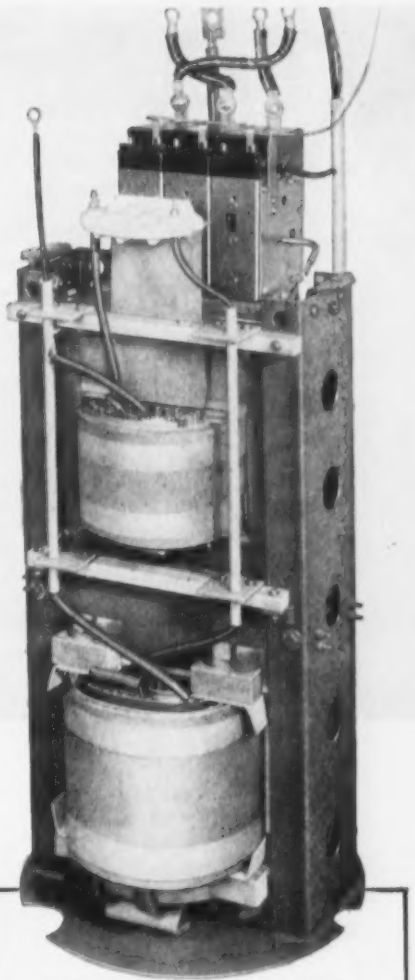
POLE STAR® DUPLEX TRANSFORMER

for Simultaneous Single- and Three-Phase Service from a Single Pole-Mounted Transformer

Pennsylvania's new Pole Star Duplex Transformers provide an efficient, economical answer wherever multiphase service is required from pole-mounted transformers. This is especially true in areas where three-phase air conditioners are used. By eliminating the need for banks of two or three units, Pole Star Duplexes simplify installation . . . lower initial costs. Mounted directly to the pole, the new duplexes require no extra cross-arms . . . make a neater appearance than do banks of transformers.

Pole Star Duplex Transformers are composed of two standard core-and-coil units mounted in a single tank — the most common combination being 37½ and 15-kva units to provide a total capacity of 52½ kva. The units are connected in open wye, open delta as shown on the opposite page, and may be equipped with CSP protective equipment.

Like all other Pole Stars, the new duplex transformers feature Pennsylvania's patented lap-on-top core. Thus, you can solve multiphase power problems and also get the low exciting current and low core loss for which Pole Stars are noted.



The internal assembly shown here is a 52½-kva Pole Star Duplex, formed by combining 37½-kva and 15-kva units. Other available ratings are: 20 kva (15 and 5 kva) . . . 35 kva (25 and 10 kva) . . . 40 kva (25 and 15 kva) . . . 62½ kva (37½ and 25 kva).

A Southwestern Utility Writes of These "Distinct Advantages" of Duplex Installations

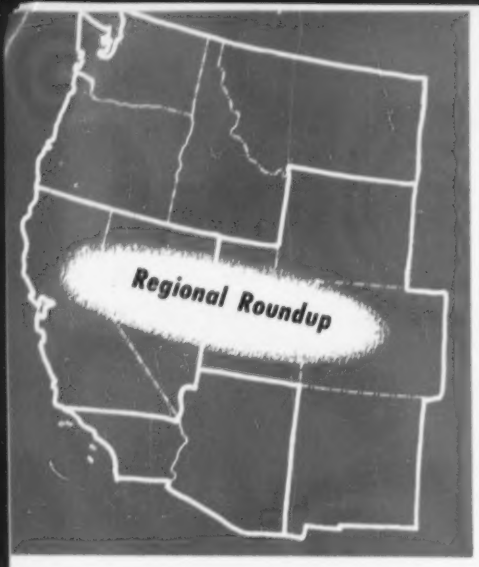
1. "Their appearance is better. This becomes more and more important as the rapid increase in three-phase residential load requires more transformer installations very close together.
2. "In the event of trouble or overload on the secondary, all three phases will be interrupted by the CSP breaker*, not permitting single phasing due to secondary trouble.
3. "May be more readily installed on existing poles.
4. "More adaptable for use on poles where secondaries are dead-ended.
5. "Heat dissipation of large tank, common to both single-phase units, permits greater flexibility in overloading one or the other of the single-phase units."

**Pole Star Duplex Transformers are available either with or without CSP protective equipment.*

PENNSYLVANIA TRANSFORMER COMPANY

A McGraw Electric Company Division **CANONSBURG, PA.** *Greater Pittsburgh District*

Pacific Southwest Region



SMOG is not the only special problem utilities have to deal with in the Los Angeles area. Now it's the "tinsel storm." This is a "man-made" shower of aluminum strips, varying from a few inches in length to 30 ft, used by military aircraft in the performance of foil tests.

Sometimes these strips play havoc with distribution lines, and Feb. 1 was one of these times. Southern California Edison reported that a total of 12 circuits, serving some 25,000 people in portions of Long Beach, Compton, Redondo Beach, Santa Ana, Alhambra, Montebello and Huntington Beach were interrupted for periods ranging from half a minute to nearly three hours—in spite of all-out efforts on the part of Edison repair crews. Thirteen lines were burned down.

Luckily none of the falling tinsel caused interruptions to substation equipment or major high-voltage lines, though foil was found in the vicinity of both.

► The Los Angeles Electric League's monthly survey of TV and radio set distribution shows that 36,701 TV sets and 63,614 radio sets were distributed in the seven-county Los Angeles signal area in the month of December. This brings the grand total of TV sets distributed in 1956 to 350,602, or 6% above the 1955 figure for the area, according to Glen Logan, managing director of the league. Radio set distribution jumped 19% in the same period.

► Stan Tickle did a lot of celebrating in the month of February. Not only did the month mark his third year as owner of the Frank H. Bran Co., and his 23rd year in the manufacturing agency business selling electrical goods, but he had a birthday too!

► The Osipow Electric Supply Co. has moved to larger quarters at 440 Stanford Ave. in Los Angeles, reports M. B. Tyson, a partner in the wholesaling firm.

► Hugh Sheeter, manufacturing representative for Silvray Lighting and Howarduct, has moved to a new address at 3356 Glendale Blvd. in Los Angeles, consolidating both office and warehouse at the one location.

► Talk about "power" politics (if you'll pardon the pun)—two men well-known to the electrical industry in Los Angeles, Ben Griffith and Ed Ryerson, are playing active roles in the upcoming city elections in April. Ben, a past-president of the city's Water & Power Commission (he resigned last July) and the Colorado River Assn., is now general chairman of the Committee to Re-elect Mayor Norris Poulson. Ryerson, an electrical engineer with North American Aviation and a board member of the Aircraft Electrical Society, in charge of the society's annual electrical equipment display in the Pan Pacific Auditorium, is a candidate for the city council from the 11th district.

► Sangamo Electric has established a new South Pacific Coast District office at 1819 W. 6th St. The move allows for expanded activities in the electronics components field, and the coordination of sales of power equipment and electronic components. Harry Wittenburg will continue to handle power equipment and Al McCluskey has been transferred to the Los Angeles office from the factory in Springfield, Ill., to handle electronic components.

► Sam Mesick, regional vice-president of the National Association of Electrical Distributors, says C. O. Armstrong of Argo Electric Supply will be the chairman of the local Southern California and Arizona semiannual meeting at the Disneyland Hotel March 29th. A tour of Disneyland is planned for the ladies.

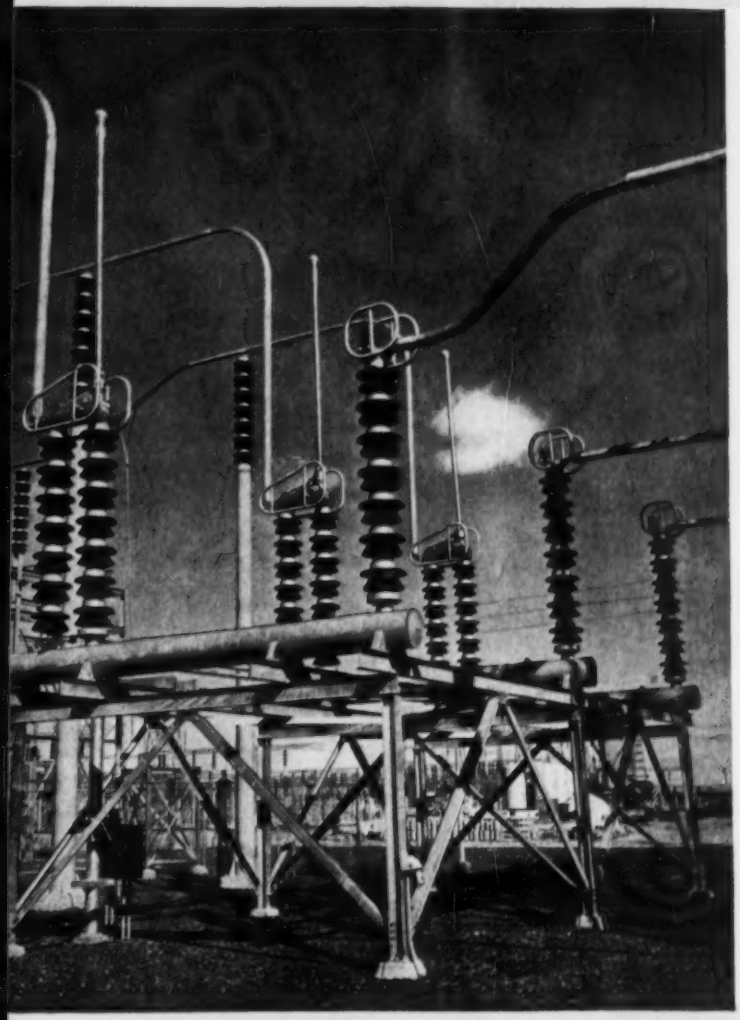
► A new electrical wholesaling firm has opened in Riverside and the owner, C. Lee Dryden, turned out to be a man with an interesting past. While much of his background has been in design, his experience has hit just about every phase of the electrical business. With some prodding, he revealed that he had been one of the original Metropolitan Water District team back in 1932, serving as a division engineer.

► A new electrical wholesaling company has been formed in Lancaster, Calif., by Merle Potter (president), and Bill Stewart (secretary-treasurer). The two purchased controlling interest in the Lancaster branch of Cal-State Electric Supply of North Hollywood, and have formed a separate corporation under the new

The whirling pace of modern business seems to take time out for pleasantry in a gesture made by Carson-Roberts Inc., the Los Angeles advertising agency that serves Square D Co. As Square D employees go to work along Valley Boulevard, they are greeted each morning by an attractive billboard that says: "To Our Associates at Square D—Have a Happy Day." It must be pleasant encouragement to Square D folks

NOW IN SERVICE...

FEDERAL PACIFIC'S 345-KV AIR SWITCHES



Features of the TG Switch Line:

- High momentary current ratings
- Minimum number of current interchange points.
- High pressure duplex contact shoes
- Weather resistant housing
- Rigid base construction
- Solid-silver inserts—non-galling contact
- Dependable floating shoe construction
- Simplified linkage and anti-friction bearings
- Available in voltage ratings from 7.5 to 440 kv.

Part of the TG-4 345 kv Switch Installation on the McNary-Ross Line of the Bonneville Power Administration.

Federal Pacific TG-4 air switches are among the first to go into service in the United States at 345 kv. Currently in operation at the Umatilla, Oregon, end of the 175 McNary-Ross line which supplies power for the city of Portland, Oregon...these switches have a 1,300-kv B.I.L., 1,600-amp continuous current, and a momentary rating of 70,000 amperes.

Keeping pace with the ever-accelerating trend toward higher and higher voltages, Federal Pacific is ready to help *you* with *your* extra high voltage problems—now!

For further information call your nearby Federal Pacific representative, or write to the Pacific Switchgear Division, 5815 Third St., San Francisco 24, California, for Catalog 4-129.

Finest Products Engineered

FEDERAL PACIFIC ELECTRIC

COMPANY

Main Office: 50 Paris Street, Newark 1, N. J.

Plants at Newark, N. J.; Long Island City, N. Y.; Cleveland, Ohio; St. Louis, Mo.; Dallas County, Texas; Scranton, Pa.; Los Angeles, Calif.; San Francisco, Calif.; Santa Clara, Calif.; Emeryville, Calif.; Affiliated Plant, Toronto, Canada.

(though similar) name, Cal-State Electric Supply Co. Of Lancaster. Both men were previously with Smoot-Holman Co., Merle as district sales supervisor and Bill as sales engineer. The firm will serve the Antelope Valley with a complete line of name brands of electrical supplies. Ivan Schearer, who has operated the branch for the past two years, will remain under the new management.

Intermountain Region

"WE'RE ahead of last year." That's the optimistic business report from three important electrical suppliers in the Rocky Mountain area.

W. L. (Bill) Duncan of Denver, sales manager for General Electric Supply Co. in Colorado, reports a backlog of orders up 300% from 1956. Billings this year are up 12%.

Howard Peterson, owner of a Denver supply firm bearing his name, says "business is going along at a pretty good clip. It's exceeding last year by a substantial margin."

Peterson is a distributor for Pennsylvania Transformers, Eagle Signal, Preformed Line Products, Clark Controller Co., Reliance Electric & Engineering Co., S&C Electric Inc. and Burndy Engineering Co. Peterson's distribution area covers Colorado, Wyoming and northern New Mexico.

"We expect business to hold up well the rest of the year," Peterson said. The firm had a sales force of six men last year and has added one more recently to meet expanding demands.

Stacy C. Hinkle, sales manager for the Mine & Smelter Supply Co., looks for a 5 to 7% increase this year in sales volume. The firm, with branches at Salt Lake City and El Paso, Tex., is a distributor of Westinghouse apparatus. "Industrial and commercial construction is going to be strong in the region," Hinkle said. "This will be a good field for electrical supplies."

Mine & Smelter is opening new headquarters including office, warehouse and shop facilities at Denver early in April. The buildings, including mechanized facilities for handling supplies, occupy a 10½-acre site.

Duncan reported General Electric Supply has just opened branches at Colorado Springs and Pueblo to handle growing demands in those sections. The Colorado Springs branch, 410 Fillmore, is managed by Bob Swanson. Bob Savage was named manager for the Pueblo branch at 201 S. Grand Ave. Both stores have 7,500 sq ft of floor space. The Colorado Springs branch is in a new building and the Pueblo branch is in a remodeled building.

Contributing to General Electric's large backlog, Duncan said, are orders for electrical materials for the 28-story Murchison building, under construction at Denver, and the U.S. Air Force Academy at Colorado Springs.

► L. W. Bryan, co-owner of Rocky Mountain York Co. at Denver, reports his firm has recently expanded to include the industrial line of air conditioning and refrigeration produced by York Corp., a subsidiary of Borg-Warner Corp. Bryan said Rocky Mountain York Co. has represented the commercial division of York for 16 years.

Northern California Region

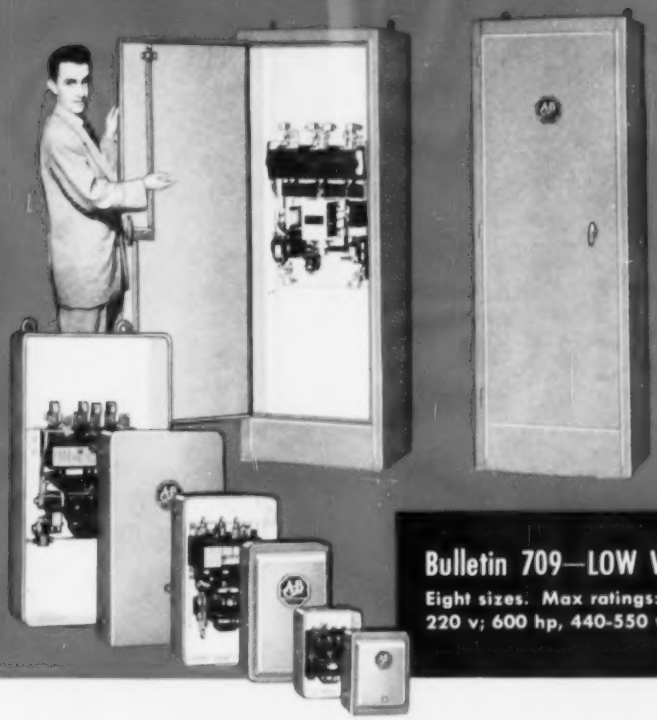
WITH mixed emotions, like the man watching his mother-in-law drive off a cliff in his new Cadillac, we receive the news that Ray Waggoner has been elected executive vice-president of Hubbard & Co., which of course takes him from our area. We'll miss him.

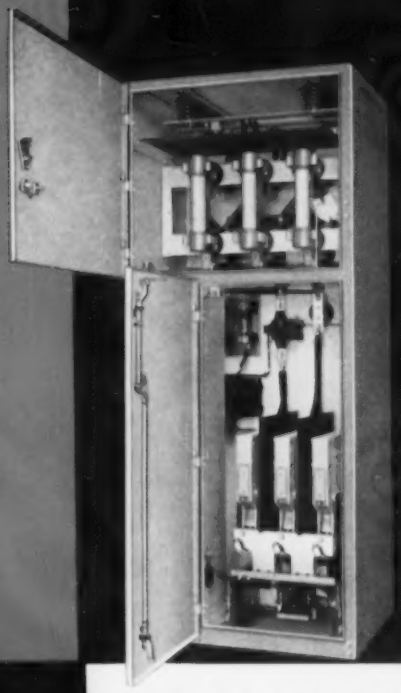
At the same time, we welcome L. T. Owen, who moves here from Boise to take over Ray's former job as general manager of Pacific Coast operations.

► D. C. Burnham, vice-president of manufacturing of Westinghouse, was a northern California visitor in February. He weathered a press interview in Walt Maytham's office that was followed immediately by an interesting presentation at the San Francisco Electric Club. About the interview, Burnham said: "I thought we'd be lucky to keep it alive 10 minutes and it lasted an hour."

Duration of the interview, attended by local newspaper and trade publication reporters, can be attributed to Burnham's own personal attraction and to the fact that he is loaded with ideas on getting manufacturing cost reduction from

a complete line—





Bulletin 709—LOW VOLTAGE
Eight sizes. Max ratings: 300 hp, 220 v; 600 hp, 440-550 v.

Bulletin 1159—HIGH VOLTAGE
Two sizes. Max ratings: 1500 hp, 2300 v; 2500 hp, 4600 v.

# of across-the-line Solenoid Starters

About 25 years ago, Allen-Bradley introduced the first modern *solenoid* starter . . . a revolutionary new design. Because of its simple construction and the resultant greater reliability, this starter became the model for the industry. Other manufacturers brought out solenoid starters in the lower ratings, but—only Allen-Bradley offers a full line of *eight* sizes. Like their smaller brothers, the higher rated starters provide an extremely long life and unfailing reliability.

Recently, Allen-Bradley announced a new line of high voltage starters—5000 volts, max—using the same reliable solenoid construction principles. These new air break starters have a mechanical life of millions of operations. Try them on your toughest high voltage applications and let yourself be surprised. Write for bulletin.

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada—Allen-Bradley Canada Ltd., Galt, Ont.

all have *DESIGN SIMPLICITY* for trouble free operation

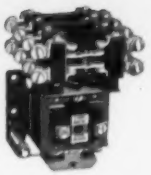
- Only one moving part. No pins, pivots, or flexible jumpers.
- Double break, silver alloy contacts need no maintenance.
- Compact switch mechanism provides plenty of wiring space.
- Reliable overload relays protect the motor at all times.

A-B Quality

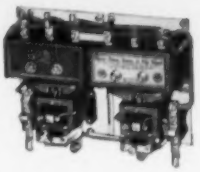
ALLEN-BRADLEY
MOTOR CONTROL
QUALITY

"we'll use ALLEN-BRADLEY Quality Motor Control ...it's trouble free!"

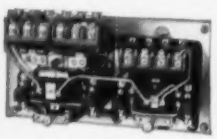
SPECIFY THESE RELIABLE MOTOR CONTROL UNITS



Bulletin 700
Universal Relay with
N.O.—N.C. Contacts

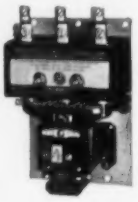


Bulletin 705 Size 2
Reversing Starter

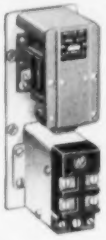


Bulletin 715 Two
Speed Consequent
Pole Starter

Bulletin 802T Adjustable
Lever Oiltight Limit
Switch



Bulletin 702 Three Pole
Size 2 Contactor



Bulletin 849 "On-Delay"
Pneumatic Timer

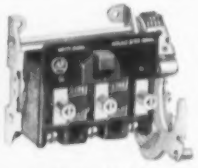
Bulletin 892
Handy Terminal
Blocks

Bulletin 704, Mechanically
Held, Hum-free Relay

Bulletin 200
D-C Relay

Bulletin 350
Reversing Drum Switch

Bulletin 836
Pressure Control in
NEMA Type 4 Enclosure



Bulletin 894
Visible Blade
Disconnect Switch

Bulletin 709
Size 4 Automatic
Starter

Bulletin 609
Three Phase
Manual Starter

Oiltight Push Button, Selector Switch, Press-to-Test
Pilot Light, and completely assembled Oiltight Station

Allen-Bradley *quality* components assure you millions of trouble free operations. The simple design, maintenance free, double break, silver alloy contacts, and rugged design features have made them the first choice among design engineers, contractors, and maintenance men. You just can't go wrong with this QUALITY line.

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada—Allen-Bradley Canada Ltd., Galt, Ont.

Send for your copy of the new 7th edition of the Allen-Bradley Handy Catalog

3-57-MR

improved methods and equipment.

The inevitable cast something of a pall on the conversation. He had to verify that improved methods can only go so far in preventing price increases. The 3 to 5% annual inflation rise is going to show on price tags eventually.

But the things Burnham deals with gives increased productivity from the same plant space, and an important by-product—better quality products that are more simple to manufacture and also to maintain.

► Jack Beckett succeeds Kurt Steindorff as president of the San Francisco Electric Club. New directors are: Frank Dickey (who recently became a father—again), Harold Rethmeyer, Brodie Leihy and Dean Cady. Charlie Huyck is again secretary-treasurer, and we'll pick a bone with the programming that left his "Sparks" off the calendar two meetings in a row. Just doesn't seem like home without "Sparks."

► General Electric Co. played host to most of the industry people at one or both of two open houses in our area in February. G-E Supply showed off its impressive new distribution center at San Jose, which is Gesco No. 6 in the territory. At Millbrae, G-E Appliance Division has set up a brand new showroom and warehouse that is the last word in facilities of its kind. The model kitchen and laundry centers are really works of decoration art.

► Another expansion in the neighborhood is by Motorola, which has developed enough two-way radio business to warrant moving its West Coast headquarters to a new and larger building at Burlingame. Office area is doubled to accommodate certain administrative services formerly handled in Chicago.

► Burlingame also is the home of T. R. Routh Co., metering and control specialist, who is now at 1209 Capuchino Ave. New telephone number is DIamond 2-4147.

► Reno's recent blast disaster sobered the Bay Area folks because business ties are close. Out of the tragic affair, though, comes the name of a Sierra Pacific Power Co. man, Orville Owen, who prevented the loss of hundreds of lives by efficiently recognizing the seriousness of the situation and then warning all the neighboring business houses to get the people out. Sticking to the job of trying to locate the source of the gas leak caused him to be in a place where the shock of two different explosions left him crawling half unconscious through fire and

Specify

morganite

for

ALL SIX!

1. Motor and Generator Brushes
Morganite brushes enjoy a reputation world-wide for trouble-free service. For fractional horsepower, aircraft, automotive, traction and industrial use.

2. Carbon Brush Holders
Assure high efficiency brush operation by maintaining positive contact between the brush and the commutator or ring. Standard types include cantilever radial, radial, trailing, reaction and AC slip ring holders.

3. Electrical Contacts
Including drum controllers, contactors and starters. Incorporate metals in a refractory carbon base for improved electrical conductivity and mechanical strength. Self-lubricating; non-welding.

4. Carbon Current Collectors
Reduce operating costs on travelling cranes. Cost less, wear longer and reduce conductor wear to a minimum. Will not blister or rough conductor, afford trouble-free service over long periods.

5. Carbon Specialties
Morganite self-lubricating carbon specialties include bearings, seal noses, piston rings and pistons, pump vanes, valves, radar components and other parts for electrical and mechanical equipment.

6. Morganite Refractories
TRIANGLE RR, impervious recrystallized alumina, crucibles, insulators, pyrometer and furnace tubes. 99.7% Al_2O_3 —max. temp. 1950°C—3542°F. TRIANGLE HS, impervious mullite tubes. Max. temp. 1700°C—3092°F.

ENGINEERS and DESIGNERS! Morganite electrical components and self-lubricating carbon products offer many important advantages of interest to designers, production and maintenance engineers. Complete catalogs available on request; please mention products in which you are interested.

Morganite

INCORPORATED . . . FOR OVER HALF A CENTURY

TRADE MARK 3322 48th Avenue, Long Island City 1, New York

Manufacturers of Fine Carbon Graphite Products including Carbon Specialties, Motor and Generator Brushes, Carbon Piles, Current Collectors and Electrical Contacts

Distributors of 99.7% Pure Al_2O_3 Tubes and Crucibles

NEW FURNAS ELECTRIC

OIL TIGHT

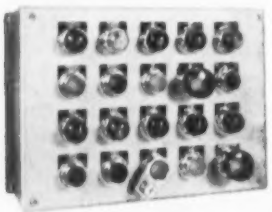
PUSHBUTTONS

Designed for Every Application

Now for the first time, because of standardization and interchangeability, more combinations of Oil Tight push buttons are available with fewer parts. As a result, Furnas Electric design and research again lead the field, this time with the finest oil tight push buttons available.

When you specify Furnas Electric, you get one standard contact block. No rights or lefts—no special units for horizontal or vertical mounting.

Accessories (key lock, mushroom head or lever) are mounted directly on all standard operators. Operators need not be modified or removed from panels.



For full information write for Catalog 5606, Furnas Electric Company, 1082 McKee Street, Batavia, Illinois.

A17

FURNAS ELECTRIC COMPANY

BATAVIA, ILLINOIS

Sales Representatives in All Principal Cities

Robert Baggot of Sunnyvale, Calif., and Williams Ross of Seattle are shown basking in Jamaica, British West Indies, sunlight. The two Westerners attended a four-day work and play meeting of regional sales representatives of Globe Lighting Co.

debris to safety. He wasn't able to remember how he had made it. *Hats off to Orville Owen.*

► Lancaster R. "Bud" Fontaine is new manager of the San Francisco office of the Kerite Co. Bud has been affiliated with the Pacific Gas and Electric Co. and a resident of San Francisco for the past 10 years. He is a member of the Electric Club of San Francisco and is a graduate of Stevens Institute of Technology, New Jersey, and a registered professional electrical engineer.

► Hinton Williams is now district manager for Joslyn Pacific Co., and is heading up a district that includes all of northern California and northern Nevada. Hinton was with Kerite Co. eight years, six in New York and two in San Francisco. He is a member of the San Francisco Engineers Club and the Electric Club of San Francisco.

Pacific Northwest Region

THE LION and the lamb are lying down together in Portland as Portland General Electric Co. starts its program of conversion of boilers at station L to provide for burning natural gas. Boiler No. 13, now equipped for burning hog fuel only, and No. 16, an oil-only burner, are ot be converted to burn either oil or gas. Work is scheduled to start May 1 and No. 13 will be completed June 15. In the meantime, the company is negotiating with Portland Gas & Coke Co. a contract to take interruptible gas.

Both boilers are Babcock-Wilcox, 400 lb. and in charge of the conversion will be James F. Grieve, manager in Portland for C. C. Moore & Co.

At the same time, studies are under way to determine the feasibility of converting boiler No. 14, the largest hog-fuel burner in the world.

► The dam-fish problem, which utility folks are apt to think of as the damn fish problem, and fishermen, the damn dam problem, is being attacked on another front this month. Gen. O. E. Walsh, PGE's vice-president in charge of engineering and construction, has concluded arrangements with the engineering school of Oregon State College to test the water flow in the spillway and the fish ladder of Pelton Dam. Using models, tests will show the effect of the flow through the actual structures on the dam under different operating conditions. Of

prime interest is the fish skimmer at the top of the ladder, designed to skim off the downstream migrants and lead them into the ladder.

► General Electric Co., Ralph Cordiner's manufacturing concern—not the local power company, moved its Portland sales staff Feb. 18 from the Public Service Building in Portland to a fine new building in the Guilds Lake industrial area of town. Address is 2929 N. W. 29th Ave.

Moving into the building in February was the Apparatus Sales Division, headed in Portland by John Gogins, plus the G-E Electronics Division with Phil Dellwo and the Portable Appliance Division with Don Brown.

► Industry folk in the Northwest had the opportunity during February of welcoming Howard H. Bullock of G-E, Los Angeles, who had just arrived in Seattle to take the managership of the Apparatus Sales Division for the Pacific Northwest district, a position made vacant last November by the untimely death of Pat Murphy.

► Two newspaper men of Portland have forsaken the Fourth Estate to get into public relations work with the utilities. James Ferguson, formerly business news editor of the *Oregonian* and McGraw-Hill correspondent, joined Pacific Power & Light Co. in January as news director in the advertising and public relations department headed by R. K. (Jack) Foley, advertising manager. In a similar move, Bob Swan, formerly *Oregonian* sports editor, will handle public information for PGE under Fred Kempe, head of the department of public relations and advertising. Swan succeeds Robert H. Short, who was named assistant to Board Chairman Thomas W. Delzell.

► Deskin O. Bergey, district manager for Pacific Power & Light Co. at Coos Bay, Ore., has been made assistant general manager for the company's Coast division, succeeding Lloyd Edwards, who is retiring. Bergey will have the Coos Bay, Tillamook and Astoria districts under his jurisdiction. Frank Reis, new sales manager for the company, conducted a bang-up sales meeting in January and Richard Jones of the company's sales staff in Hood River received the county Junior Chamber of Commerce award for his work in Pee Wee baseball, Toastmasters, 4-H and Rotary, but more particularly for heading the 1956 March of Dimes and United Fund drives.

TURN MINUTES INTO YEARS OF Protection at the vital points of overhead conductors

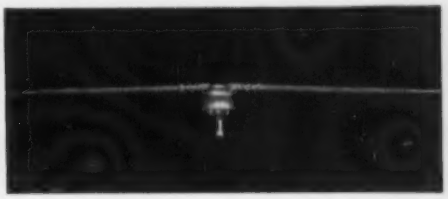
fine FANNER

SUPERFORMED ARMOR RODS

are easily applied . . . provide positive full-length grip and absolute uniformity of application

Fine Fanner SUPERFORMED Armor Rods offer the economical way for positive, lasting protection of overhead transmission and distribution lines. Their INSTALLED cost is so small compared with the service failures they prevent, it pays to install them at all points where vibration damage is likely to occur.*

Armor rods are easy to apply.



Completed armor rod installation.

Whenever you need accessory items for overhead conductors you'll do far better by standardizing on fine Fanner SUPERFORMED products. Each product in the Fanner SUPERFORMED line is carefully engineered and accurately manufactured. Highest quality materials provide long service life. Special packaging insures safe delivery and protection in storage. With all their extra features, Fanner SUPERFORMED products cost no more than ordinary products.

Armor rods and other products in the SUPERFORMED line are fully described in current literature. Write today for your copy.

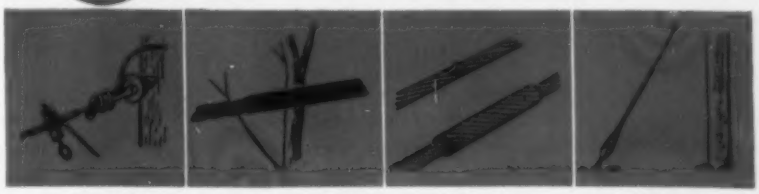
*Where spans are short and tensions low, use Fanner SUPERFORMED lineguards.

Licensed for use under patent No. 2,275,019.

THE FANNER MANUFACTURING CO.
Electrical Products Division
BROOKSIDE PARK • Established 1894 • CLEVELAND 9, OHIO
Telephone: SHadyside 1-6000

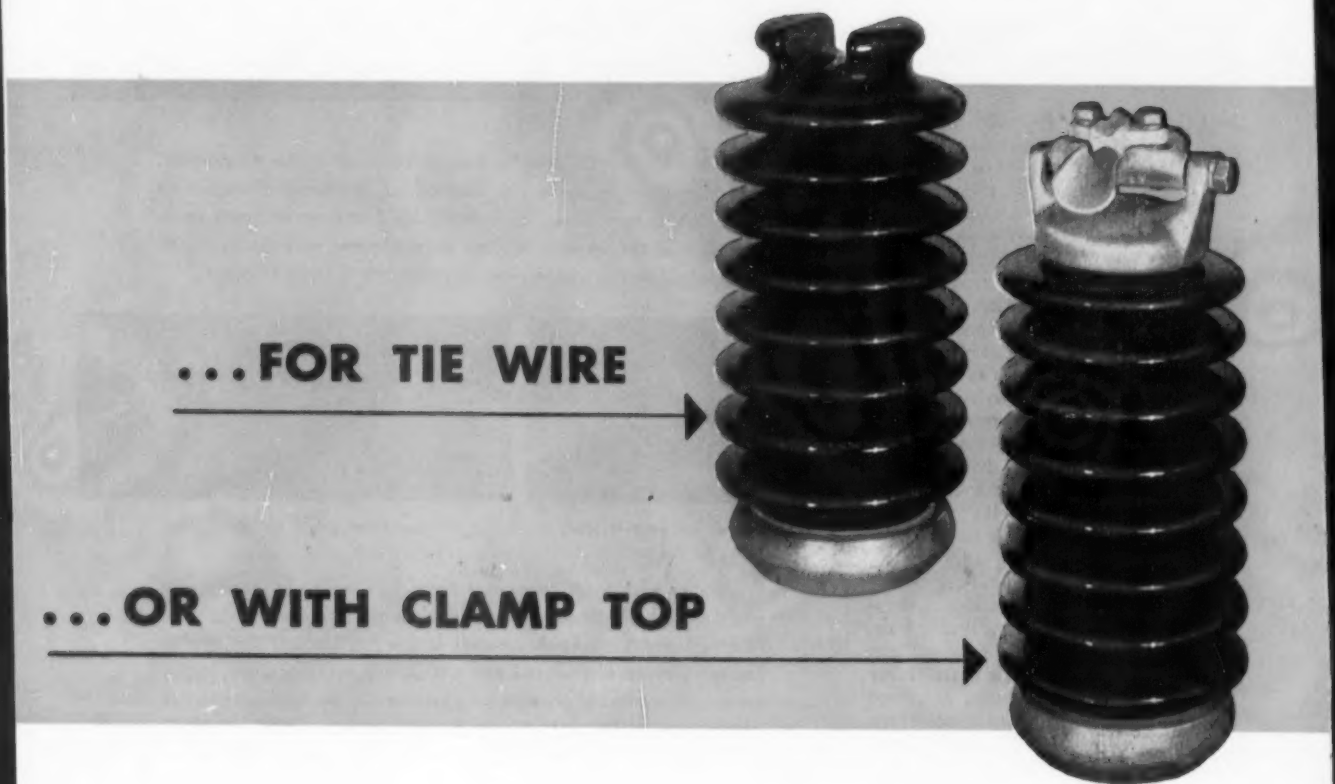
Fine Fanner Superformed

AGENTS AND DISTRIBUTORS IN PRINCIPAL CITIES



TAP ARMOR PLASTIC FANNGUARDS PATCH RODS FANNGRIPS

Lapp builds the Line Post

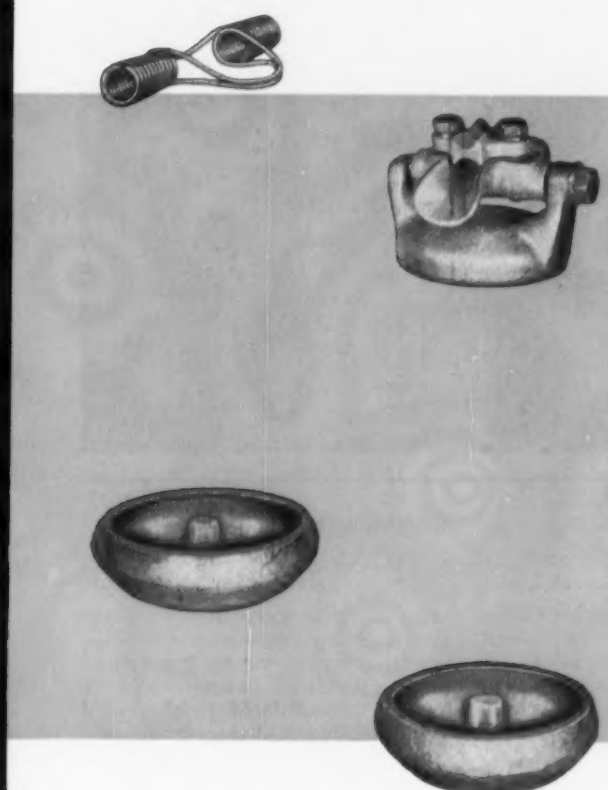


Lapp Insulator Co., Inc., Le Roy, N. Y.

Lapp

WESTERN REPRESENTATIVES:
Los Angeles: Earl S. Condon Co.
Seattle: Charles F. James
San Francisco: C. E. Ingalls & Sons
Butte: R. E. McDonough Co.
Salt Lake City: Riter Engineering Co.

This is the hardware

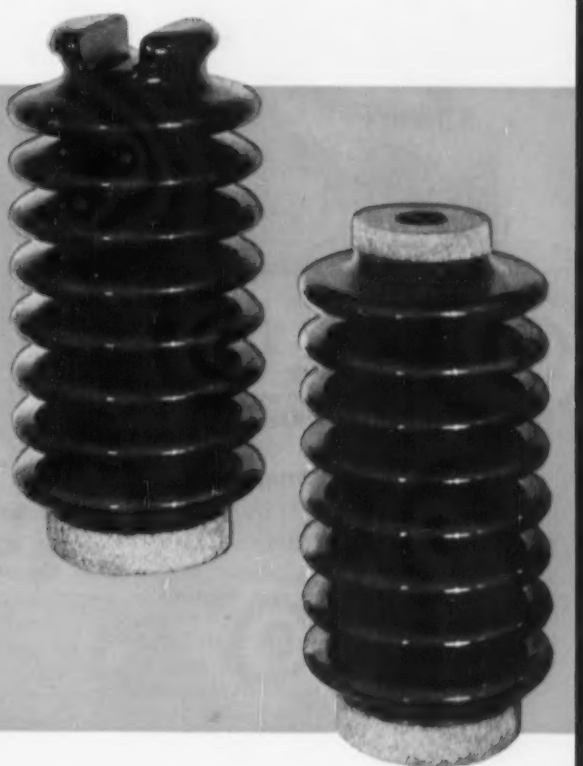


For tie-wire installation, the Lapp Line Post provides a deep, square-side top groove. Such an installation provides a "mechanical fuse"—the conductor can slip through to relieve structure load in case conductor breaks.

With clamp-top assembly, the Lapp Line Post provides for easiest installation or change-out of any clamp-top design. A single cap screw with captive washer is the only loose part throughout installation. For change-out, the clamp stays on the conductor. All clamps are interchangeable on all sizes of Lapp Line Posts

In either type of assembly, the tie-wire, the base or the clamp top are mechanical parts. Their function is only to attach the conductor to the insulator and the insulator to cross arm or pole—and to provide such attachment in a way that will permit the insulator to do its job faithfully.

This is the insulator



With either tie-wire or clamp-top construction, the *insulator* is the porcelain post. It is a closed-end post of Lapp electrical porcelain of fog-type design. Its uniform long leakage path prevents leakage flashover in contaminated atmosphere. It has exceptional stamina under arcover and attack by stones and bullets because short, strong petticoats protect its sturdy body. It won't puncture because it has no conductive material within it. It won't crack, because its hardware . . . top and bottom . . . is *externally* attached, and can load the porcelain only in compression.

The Lapp Line Post will improve your service record and your maintenance record by providing an *extra* margin of operating security, low upkeep and long life.

PRODUCT NEWS

New Designs and Applications

The new Weathertron heat pump for residential installation is shown (right) as it appears in the bottom of a linen closet. From the outside of the house it appears as the milkman sees it here. The unit heats and cools three-bedroom home

Residence Heat Pump

(1) *General Electric Co., Air Conditioning Division, Bloomfield, N. J.*

A heat pump designed specifically for the home builder market has been announced by this manufacturer. Achieved by research and design are 50% reduction in size, one-third less weight, heating efficiency increase of 17% and a cooling efficiency increase of 32% over earlier models.

Size of the unit makes it possible to build it into the side of a home or for crawl space installation. Dimensions are: 30½x33½x46 in. Placed on an outside wall, it can project as little as 14 in. into the home.

Hinged-Cover Wireway

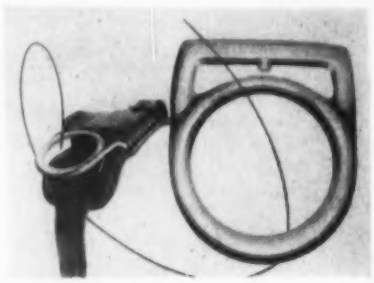
(2) *General Electric Co., Distribution Assemblies Department, Plainville, Conn.*

Designed for lay-in wiring, this new hinged-cover wireway is said to be useful where space is limited and building contours are complicated. The cover opens over the entire length of the run, permitting lay-in wiring through every length and fitting. The conductor does not have to be threaded through collars.

Dustproof Relay

(3) *Line Electric Co.,* 1407 *McCarter Highway, Newark 4, N. J.*

This company is now making a plug-in, dustproof enclosure for its LR series relay. Coils are available in all standard a-c and d-c voltages. Relay wiring diagram is printed on the enclosure.



Safety Belt Dee

(4) *Miller Equipment Co., Inc., 13th & New Sts., Franklin, Pa.*

Adaptable to any style safety belt, this new dee ring is said to make it impossible for the snap to get underneath the waist strap, thereby eliminating snap roll-out hazard. Dee-ring angle is changed for greater comfort.

Communications Wire

(5) *National-Standard Co., Niles, Mich.*

High-strength steel coated with copper makes up a new communication wire that is designed for less sag and greater resistance to storm and ice damage. Tensile strength is reported to be 250,000 psi. A possible application is for communication along remote transmission circuits.

Connector Lug

(6) *Penn-Union Electric Corp.,* 315 *State St., Erie, Pa.*

This new lug has a circular boss to which the insulation butts flush in a full circle for a snug fit and easier taping. Serrated for horizontal pull resistance, the lug is made in seven sizes from 500-100 mcm to No. 14 solid, eight-strand conductor.

Outlet Box Covers

(7) *Keystone Mfg. Co.,* 23328 *Sherwood Road, Center Line, Mich.*

Available in standard styles, this new line of covers fits all types of 4-in. square boxes. Literature and catalog available.

Cable Barrier Strips

(8) *T. J. Cope Inc., Collegeville, Pa.*

A right-angle bend permits these barrier strips to be bolted to the bed of cable trough without interfering with the use of standard covers. The barrier strip is not as deep as the sides of the trough. Both flat and riser elbow sections are furnished in 90°, 60°, 45° and 30° angles.

Splices and Dead-Ends

(9) *Reliable Electric Co., 3145 Carroll Ave., Chicago 12, Ill.*

A line of tension splices and dead-ends for use with all-aluminum conductors is being introduced by this company. Two types of aluminum tension splices added are a feed-through splice and a standard design for resag or reuse. The feed-through type has pilot cups at both ends to guide the soft aluminum conductor.

Cleaning Solvent

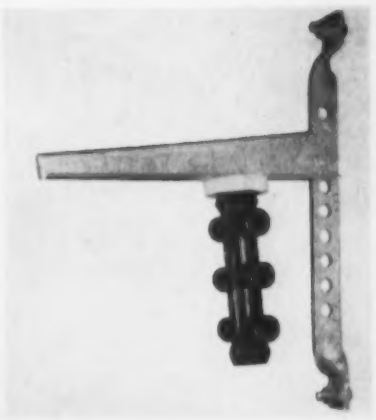
(10) *E. I. du Pont de Nemours & Co., 7506 Nemours Bldg., Wilmington, Del.*

Nonflammable solvents that will bite into and remove oil, grease and dirt without harming delicate metal parts of electrical insulation are going to be marketed by this company. Said to be adaptable to vapor degreasing or cleaning by liquid immersion.

Wire Connector

(11) *Minnesota Mining & Mfg. Co., Dept. D6-274, 900 Fauquier St., St. Paul 6, Minn.*

This company announces a spring-type electrical wire connector that makes solderless, ready-insulated splices in one step without tools. The cone-shaped coil spring is in a steel shell, which is vinyl coated for insulation.

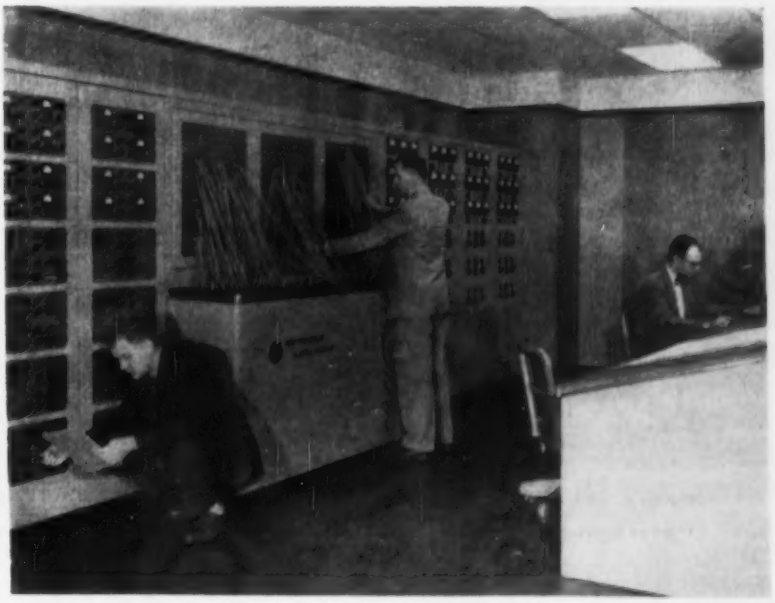


Mole Support Rack

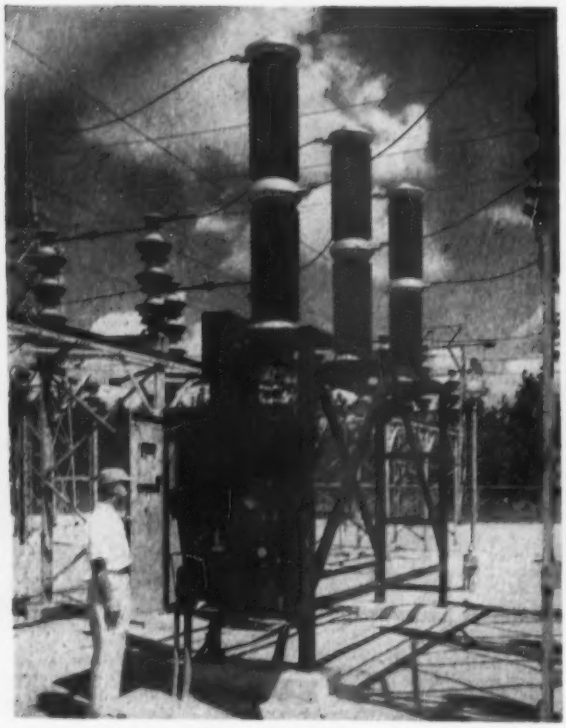
(13) *T. J. Cope Inc., Third & Walnut Sts., Collegeville, Pa.*

In cooperation with Burndy Engineering Co., this manufacturer has designed a rack to support moles used with underground distribution lines. The rack will support 1,500- and 2,000-amp moles and three-phase circuits.

For manufacturers' bulletins with additional information on these products, fill in coupon on page 30.



(12) The network analyzer installation shown is available to public utility companies, manufacturing industries and consulting engineers for their use in making power system studies. Rental time and cost information is available on request from I-T-E Circuit Breaker Co., 19th & Hamilton Sts., Philadelphia 30, Pa.



(14) Three of the first gas-filled circu't breakers ever built have been installed at a Gulf Power Co. substation at Pensacola, Fla. The breakers contain sulphur hexafluoride, a gas that is said to have exce'lent insulation properties. The gas replaces oil or air insulation and arc interruption. More data are available from Westinghouse Electric Corp., 401 Liberty Ave., Pittsburgh, Pa.

Photocopier

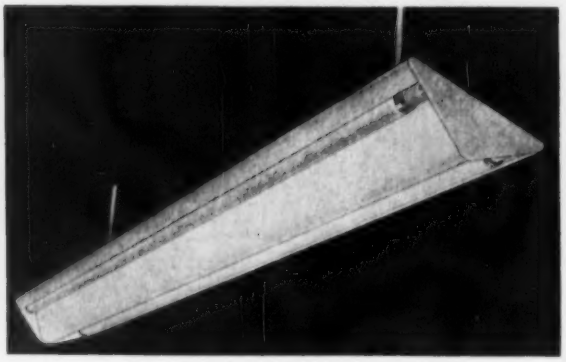
(15) *Copease Corp., 270 Park Ave., New York 17, N. Y.*

Designed for small office and for departmental use, this new photocopier will take paper for both normal and bright office lighting by simply flicking a switch. Makes copies up to 8½ in. wide and any length. Copies ink, crayon or pencil on any kind of paper, according to the manufacturer.

Aluminum-Clad Copper Wire

(16) *Westinghouse Electric Corp., Box 2278, Pittsburgh 30, Pa.*

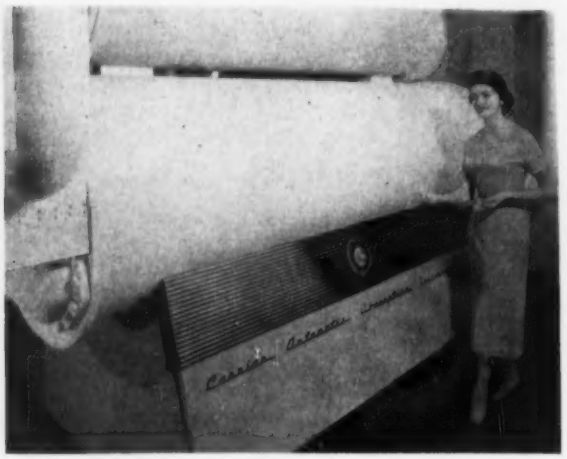
The high electrical conductivity of copper, oxidation resistance of aluminum and the protection of insulating enamel are combined in a new wire developed by this company. The wire has a thin aluminum "skin" over copper, which is in turn coated with enamel. Increased life and reduced size of electrical equipment is expected to be possible with the new wire.



School Fixture

(17) *Peerless Electric Co., 576 Folsom St., San Francisco, Calif.*

This new luminous indirect fixture utilizes the new fluorescent reflector lamps, with the result that 75% of the light is said to be distributed upward and 25% downward. Efficiency is reported to be 94%, with 35 to 40 f-c for an average classroom installation. Optional body colors are white, red, blue, yellow or matching color. Designed only for suspension mounting and for reflector fluorescent or slimline lamps.



Air Conditioning

(18) *Carrier Corp., 300 S. Geddes St., Syracuse, N. Y.*

This company is now producing 60- and 80-ton sizes of its automatic absorption refrigerating machines for air conditioning. Smallest unit before was 100 tons. Refrigerant is plain water.

"Magic Touch"

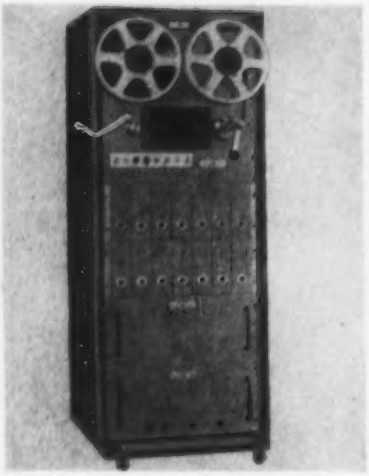
Lights burn and wheels turn when the magic of electricity surges through industry's life line of high voltage cable. Long, intensive testing has proved beyond question that Simplex ANHYDREX XX insulated cable possesses the stability and resistance that assure long, trouble-free service in all environments. Its amazing resistance to ozone and other oxidizing agents make Simplex ANHYDREX XX the logical choice for your high voltage applications. For complete technical data write for Booklet 1023.

SIMPLEX WIRE & CABLE CO.,
79 Sidney Street, Cambridge 39, Mass.

LIVE BETTER ELECTRICALLY

Simplex

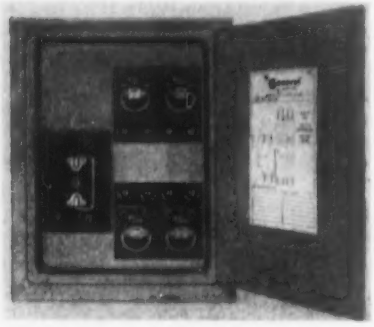
ANHYDREX XX



Data Recorder

(19) *Telectro Industries Corp., 35-18 37th St., Long Island City, N.Y.*

This new magnetic tape recorder-reproducer is designed specifically for recording and reproducing data from telemetering channels. Data are recorded on and reproduced from a 2,400-ft magnetic tape moving at 15, 30 or 60 ips. Frequency response is 200 to 20, 40 or 80 kc, depending on the speed used. Supplied as five separate units for mounting in a standard relay rack.



Disconnect Panel

(20) *General Switch Corp., 45 Roebling St., Brooklyn 11, N. Y.*

A master disconnect switch is incorporated in a new residential service entrance panel announced by this manufacturer. The 100-amp unit has eight single-pole, plug-fuse branch circuits, two 60-amp and two 30-amp, two-fuse branch pullout switches. Panel enclosure is available for surface or flush mounting and is 18x 14¼x3⅞ in. Also available with three 30-amp and one 60-amp pullout switches, or with four 30-amp and no 60-amp pullout switches.

Terminal Blocks

(21) *Square D Co., 4335 Valley Blvd., Los Angeles 32, Calif.*

A new channel mounted terminal block with 50% more terminals in the same space and simplified assembly and modification is announced by this manufacturer. The blocks are 25-amp box lug-type terminals. Also available are 25-amp terminals with pressure wire connectors and 50-amp box lug terminals. All three can be grouped on the same channel. Channel mounting allows easy addition of new terminals to existing blocks.

Transformer Test Set

(22) *Eastern Specialty Co., 3617 N. 8th St., Philadelphia 40, Pa.*

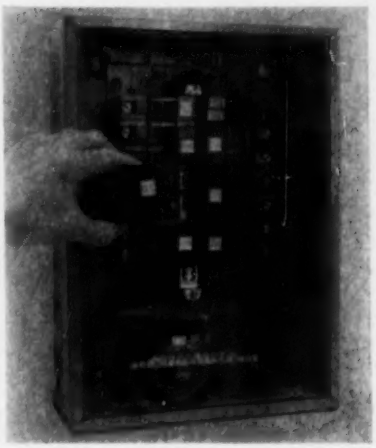
Possible sources of trouble from short circuiting, faulty connections, instrument tampering and grounding in current transformers are said to be easily detected with a new instrument developed by this company. The spread of resistance burdens is .5, 1, 2 or 4 ohms. Bulletin 54-B has information.

Prime Coating

(23) *Constad Laboratories, 85-02 162nd St., Jamaica, N. Y.*

A new zinc-base paint developed by this company is said to give chemical as well as mechanical protection against rust. Applied with either a brush or spray, the coating is said to dry in 40 minutes. Laboratory results available on tests for salt spray, adhesion, bending and the Preece test.

For more manufacturers' bulletins and coupon for use in securing them, see page 30.



Sequence Bused Enclosure

(24) *Federal Pacific Electric Co., 50 Paris St., Newark, N.J.*

This company has a sequence bused Stablok enclosure designed to provide more two-pole circuits. With 100-amp main bus lugs, the enclosure has sequence busing for six two-pole, common-trip circuit breakers and 12 1-in. NA or 12 ½-in. NC breakers. A step-type neutral lug provides two positions for No. 14 to 1/0; two positions for No. 14 to No. 6 and 10 positions for No. 14 to No. 8 conductors.

Threading Workholder

(25) *Ridge Tool Co., 400 Clark St., Elyria, Ohio*

Three workholder jaws tighten simultaneously to give true alignment for pipe threading, even on oversize or undersize pipe or conduit, according to the manufacturer. User presets the workholder cam plate to desired pipe size, which adjusts all three jaws in a single mechanical action. When threader is on the pipe, operator pumps cam lever to continue the tightening action. Style 65R threaders now in service will take the new workholder.

INSPECTORS welcome the *over-all* protection of these *full housepower* panels. All circuits are easy to identify. And one main disconnect for every 100 amps of service meets any code limitation.

BUILDERS find these nationally advertised panels pack real consumer appeal. It's easy to sell push-button convenience, maximum *over-all* electrical protection and full capacity to meet future needs.

HOME BUYERS get *full housepower* safer electrical living and push-button convenience. They'll have *maximum* over-all electrical protection and be prepared for future electrical demands.

Everybody profits with new Pushmatic panels!

Main disconnects assure over-all electrical protection!

New Electri-Centers with main disconnects are good news for you *and* your customers. Now you can upgrade jobs . . . provide maximum over-all protection, convenience and full capacity to meet both present and future electrical needs. Factory-installed main disconnects require no field wiring. And trouble-free operation eliminates profit-consuming callbacks. What's more, these new, high-quality circuit-breaker panels compare in price with ordinary panels.

Check what they mean to your *customers*, too . . . and to *their* customers. That's where acceptance and sales begin. You'll see in a hurry that the new Pushmatic Electri-Centers® are loaded with advantages—for *everyone!* Get the complete story from your BullDog distributor or field engineer.

© BEPCO

IF IT'S NEW . . . IF IT'S DIFFERENT . . . IF IT'S BETTER . . . IT'S

BULLDOG

ELECTRIC PRODUCTS COMPANY

A DIVISION OF I-T-E CIRCUIT BREAKER COMPANY

BullDog Electric Products Company, Detroit 32, Michigan • A Division of I-T-E Circuit Breaker Company • *Export Division:* 13 East 40th St., New York 16, N.Y. *In Canada:* BullDog Electric Products Company (Canada), Ltd., 80 Clayson Rd., Toronto 15, Ontario.

CONSULT THE FOLLOWING PACIFIC COAST REPRESENTATIVES:

COAST ELECTRIC & MANUFACTURING CO.
1733 N.E. Seventh Avenue, P.O. Box 7712
Portland 12, Oregon

YOUNG ELECTRIC & MFG. CO.
2134 Curtis St.
Denver 2, Colorado

SAFETY SWITCHBOARD COMPANY
910—89th Avenue
Oakland 21, California

BULLDOG ELEC. PROD. CO. OF LOS ANGELES
2885 E. Washington Blvd.
Los Angeles 23, California

"Call the museum, Joe; I think we're uprating a real antique!"

Your General Electric Apparatus Service Shop can rebuild your old transformers like new. The shop can uprate your old transformers in both kva and voltage for about two-thirds the cost of new transformers . . . can also convert to self protected type. And you get new-transformer warranties. Call your G-E Apparatus Service Shop or Sales Office. 431-59

Progress Is Our Most Important Product

GENERAL ELECTRIC

BULLETINS ETC.

(26) **INSTALLATION PRACTICES** for General Electric interlocked armor cable systems are given in publication No. 19-606. Write to General Electric Co., Wire & Cable Department, Bridgeport, Conn.

(27) **PULVERIZERS**—Foster Wheeler Corp. has published a descriptive brochure dealing with its new type MB planetary roll and table pulverizers. Developed in Germany, the pulverizer is said to offer unusual advantages in economy of operation and maintenance. Write to the company at 165 Broadway, New York 6, N. Y.

(28) **EMERGENCY CAPACITY**—Pointing out that transformer temperature determines its capacity, this booklet tells ways to utilize hidden capacity during a long shutdown of a large power transformer. Various methods of cooling the units are described. Write to Allis-Chalmers Mfg. Co., 939 S. 70th St., Milwaukee, Wis. Publication number is 01R8529.

(29) **PACKAGED SUBSTATIONS**—Bulletin SB1, describing Line Material's packaged steel substations, is now available. Six of the most popular distribution substation designs for urban, rural or industrial applications are illustrated. Typical bills of material for each design are shown for various operating voltages. Address is 700 W. Michigan, Milwaukee 1, Wis.

(30) **ASHPIT RELINING**—This bulletin describes the use of Kaocrete-32, a new high temperature refactory castable by Babcock & Wilcox for use in boiler ashpits. Methods of ash removal and maintenance problems are discussed. Ask for bulletin R-40, Babcock & Wilcox Co., Refractories Division, 161 E. 42nd St., New York 17, N. Y.

(31) **DISTRIBUTION TRANSFORMERS**—A new 56-page catalog of distribution transformers is available from Pennsylvania Transformer Co., Distribution Transformer Sales, Canonsburg, Pa. Ask for catalog 1056.

(32) **TRANSFORMER BANK FUSING**—"Primary Fusing of Parallel-Connected Transformer Banks" is the title of a new bulletin released by S&C Electric Co., 4435 Ravenswood Ave., Chicago 40, Ill.

(33) **POWER DERRICK**—J. H. Holan Corp., 4100 W. 150th St., Cleveland 11, Ohio, has published a catalog on its new Series 6700 "bow-legged" power derrick. Capacities, heights, dimensions and operating details are given.

(34) **PRICE LIST**—The 1957 prices on "Lifeguard" rain suits and accessories for linemen are carried in a brochure available from John E. Dorsey Co., 570 E. First St., Boston 27, Mass.

(35) **LIFT TRUCK OPERATION**—"How to Operate a Lift Truck" is the title of a new booklet available from the Hyster Co., 2902 N. E. Clackamas St., Portland 8, Ore. Prepared for use as part of an operator training program. Write for form 1214.

(36) **CABLE DATA**—Application and design data on three-conductor armored cables and single-conductor cable in conduit are carried in a new manual available from Rockbestos Products Corp., Nicoll and Canner St., New Haven 4, Conn. The manual applies to National Electrical Code type AVA cables.

(37) **EXCITATION SYSTEMS**—A comparison of the four basic types of automatic excitation systems is given in an eight-page leaflet entitled "Selecting Excitation Systems for Turbo-Generators" released by Allis-Chalmers Mfg. Co., 939 S. 70th St., Milwaukee 1, Wis.

KILL TWO BIRDS WITH ONE STONE—Fill out this coupon and get back valuable information from as many sources as you indicate.

ELECTRICAL WEST
68 Post St., San Francisco 4, Calif.

Not good after May 1

Please send me, without obligation, the new product information or catalogs:

If described in Product News, circle item number

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

If described in advertising, fill in page number

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NAME **TITLE**

COMPANY

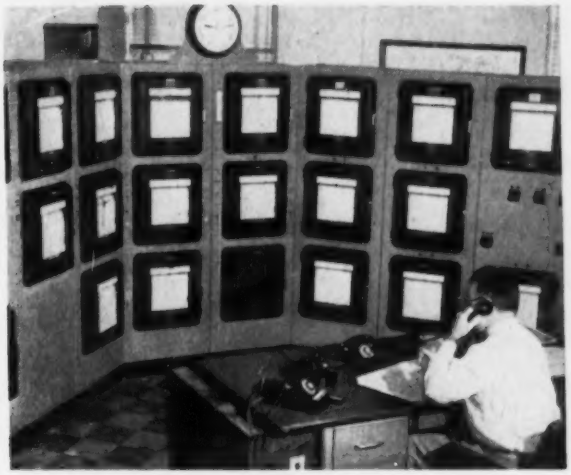
ADDRESS

CITY **ZONE** **STATE**

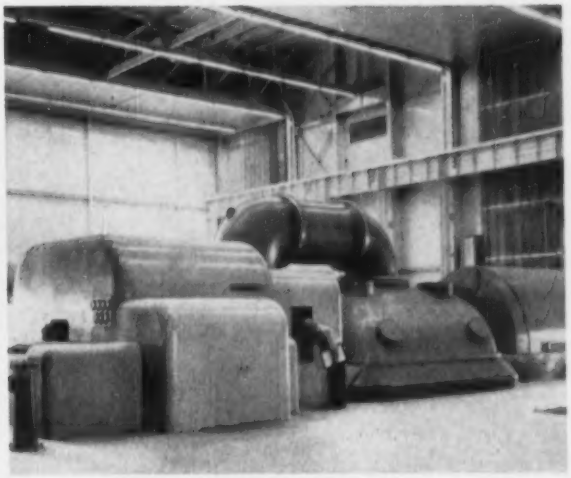
*Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

How B ll System private line communications serve the power industry

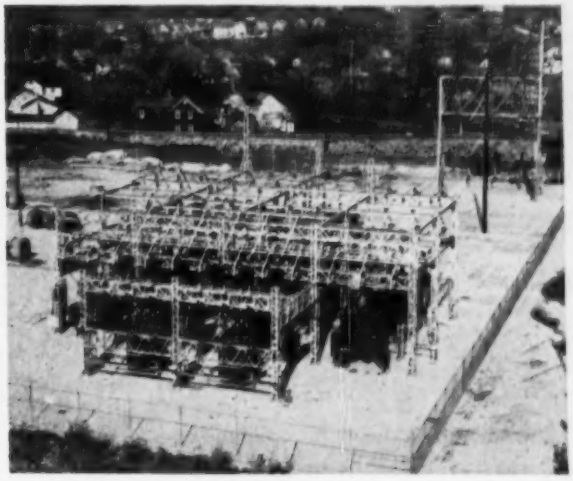
Bell System private line channels help streamline Ohio Edison operations 4 ways



1. **Continuous metering** and load control of Ohio Edison's interconnected electric system is centered at the Company's central dispatching office in Massillon. Extensive use is made of Bell System circuits in this system.



2. **Private line telephones** form an important link between power plants (like the Niles plant, above) and the Massillon dispatching center, permitting close control of operations. The Edison Company serves more than 550,000 customers.



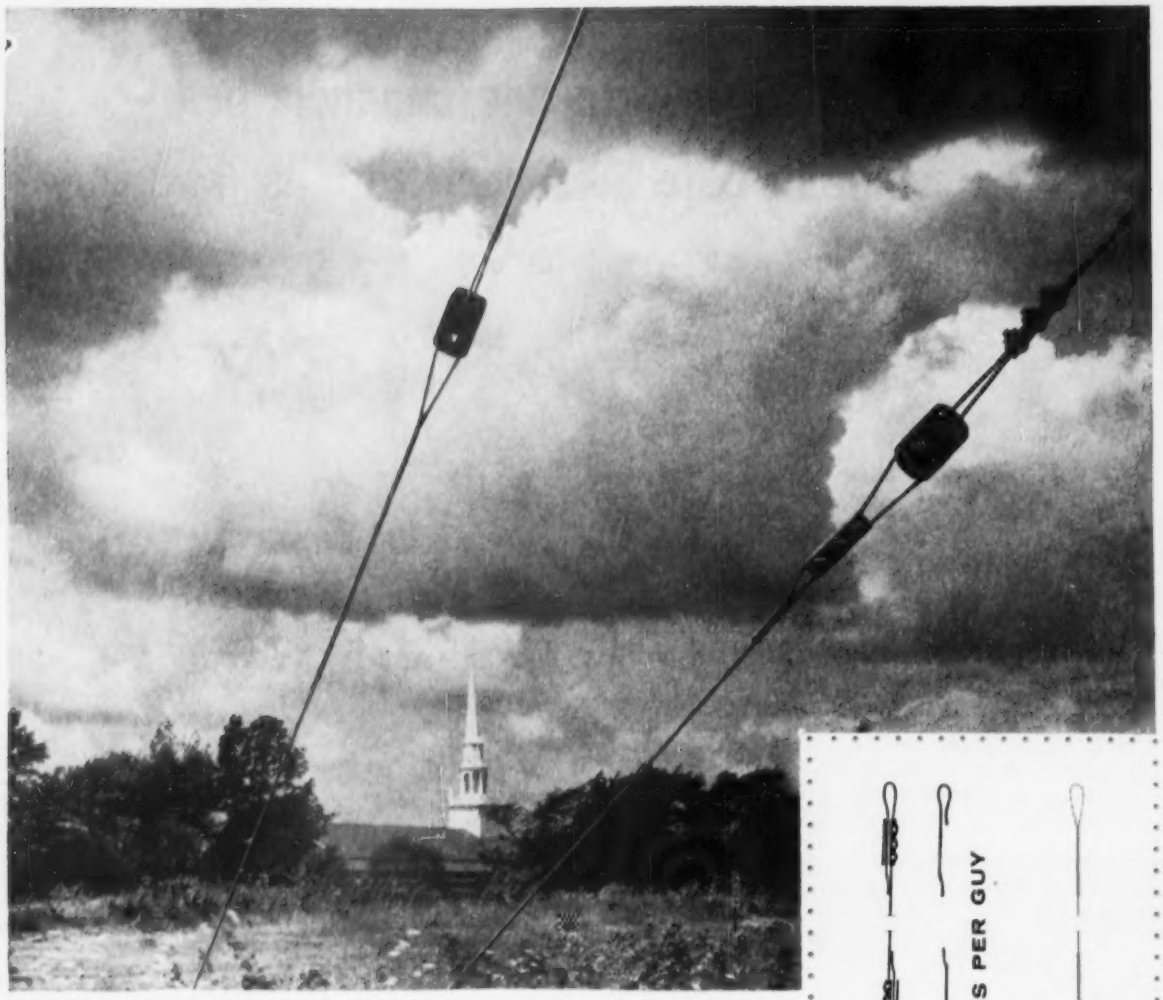
3. **Bell System circuits** for remote metering and control give the Akron division dispatcher an up-to-the-minute picture of conditions at substations in his area. Similar circuits also provide supervisory control over substations in certain other areas served by the Company.

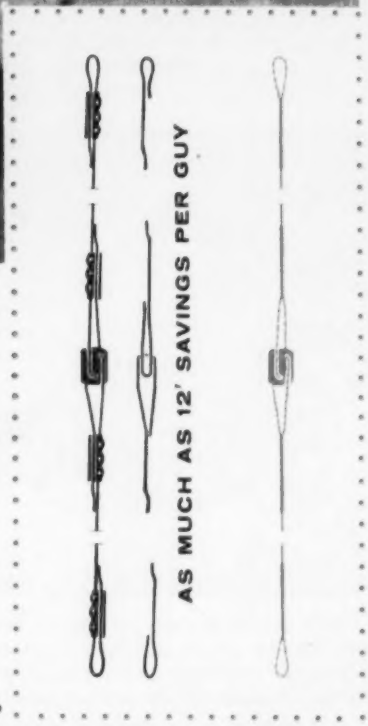
4. **Audible indicating** enables Ohio Edison dispatchers to pick up the telephone, dial certain unattended substations and learn from a tone signal the existence of trouble at that particular substation. This system provides an additional safeguard for service continuity.

Bell System communications can work for you just as they do for Ohio Edison. Call your Bell Telephone Company business office. A representative will be pleased to study your communications needs.

BELL TELEPHONE SYSTEM

PRIVATE LINE TELEPHONE • PRIVATE LINE TELETYPEWRITER CHANNELS FOR: DATA TRANSMISSION • REMOTE METERING AND CONTROL • TELEPHOTOGRAPH • CLOSED CIRCUIT TV





Up to 30% savings in strand... with PLP Guy-Grip Dead-Ends

You will find real guying economy with PLP Guy-Grip dead-ends. Because they eliminate strand looping, you can use *shorter, straight* lengths of guy strand. This means as much as 12 feet savings in strand per guy. What's more, the finished installation is neat, streamlined, efficient.

PX-80

Made in accordance with or for use under U. S. Patent No. 2,761,273; other patents issued and pending.

PREFORMED LINE PRODUCTS CO.

5349 ST. CLAIR AVENUE • CLEVELAND 3, OHIO
DEPT. NO. PR4B
Telephone: Cleveland EXpress 1-3571

low-cost AND dependable

through countless operations

KEARNEY
TRIP-O-LINK FUSE CUTOUTS

Regardless of length of service or number of operations, the dependable Trip-O-Link, with its replaceable cartridge and fuse, *continues* to extinguish the arc in less than one cycle.

Mechanical energy of short circuits is dissipated through low mass, flexible cutout arms which do not resist the impact, but *flex with it.* Since the shock is not transmitted to the insulator, Trip-O-Links make countless operations without suffering mechanical damage.

A patented feature of Trip-O-Link Fuse Links combines fusible element, fibre bakelite cartridge and leaders into a single, easily handled unit, providing a new arc quenching cartridge every time the cutout operates within its rating. Trip-O-Links are easiest of all cutouts to re-fuse.

JAMES R. KEARNEY CORPORATION

General Offices

4224-42 Clayton Avenue • St. Louis 10, Missouri

IN THE WEST: for prompt service, contact Kearney's West Coast Distributor, **Maydwell and Hartzell, inc.,**
Los Angeles • Seattle • Portland • San Francisco • Spokane • Phoenix.

863-W

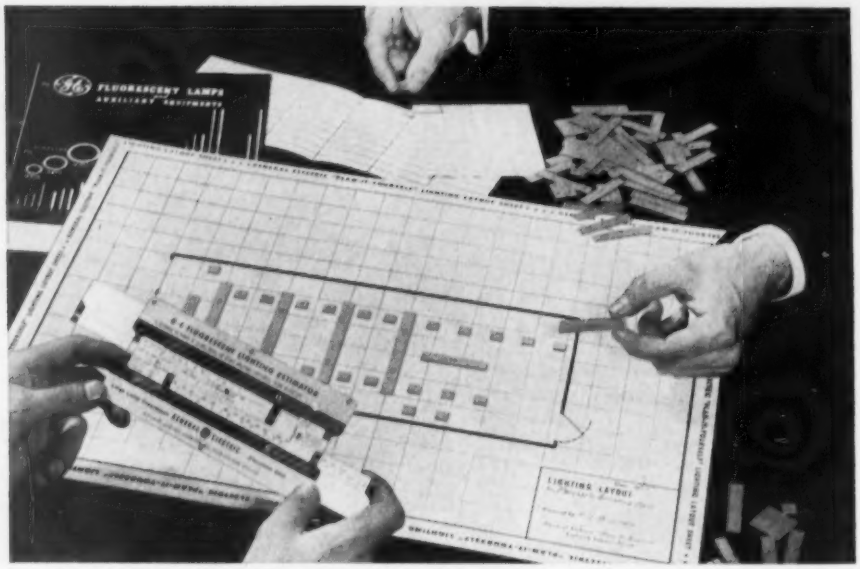
for BETTER CONSTRUCTION
SAFER MAINTENANCE
Specify

KEARNEY PRODUCTS

JAMES R. KEARNEY

The Mark of Quality

Plants at: ST. LOUIS • FAYETTEVILLE, ARK. • SHENANDOAH & CLARINDA, IOWA—GUELPH, ONT., CANADA



G-E Lighting Layout Kit *contains layout sheets; a fluorescent lighting estimator; movable, scaled "fixtures"; gummed "fixtures" for your permanent layout; and a lighting design guide.*

"This kit helped me sell three lighting jobs worth $1,300 . . . all the same day"

Mr. Harry K. Flynn *of Welch Electric Co., Urbana, Ohio.*

New General Electric "Plan-It-Yourself" Lighting Layout Kit can help you sell More Lighting Jobs, Too!

Mr. Harry K. Flynn of Welch Electric Co., Urbana, Ohio, read about the new G-E *Lighting Layout Kit* . . . sent for it . . . and put it to work. *The next day, he used it to help sell 3 lighting jobs totaling over $1,300 worth of business!* Here's how a G-E *Lighting Layout Kit* can help you make more sales, too:

1 **YOU'LL SELL EASIER** because your prospect is in on the planning and he helps sell himself. He visualizes his lighting requirements more easily.

2 **YOU'LL "SELL UP".** Your prospect sees why the new lighting layout fits his needs, so you can sell him a better lighting job . . . and make more profit!

3 **YOU'LL "CLOSE" MORE SALES.** Your prospect okays the completed layout and your sale is half closed, even before a complete cost estimate is made.

Get your G-E Lighting Layout Kit from your General Electric Lamp Supplier today!

Or send $1.75 to: General Electric Co., Large Lamp Dept. WE-3, Nela Park, Cleveland 12, Ohio.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Plants at: ST. LOUIS • FAYETTEVILLE, ARK. • SHENANDOAH & CLARINDA, IOWA—GUELPH, ONT., CANADA

MARCH 1957

ELECTRICAL WEST SALES GUIDE News Letter

FOR THE ELECTRICAL MERCHANT OF THE WEST

It was a good market

Attendance at San Francisco's Winter Market was on a par with last year. More than 16,000 came to see new models and trends, gage the sales climate for the year ahead and place orders. Interest was centered on complete kitchens and new styling, with built-ins and color still popular.

New face in old space

Easy got moved into its new Merchandise Mart quarters (the old Crosley-Bendix space) just in time for Market Week. Under the new set- up Richard Kelley, who works out of Chicago, is Western sales manager; Jack West continues as regional manager.

New models gimmicks, and gadgets at Market

Among the new things: Hotpoint has put a percolator into the deep well unit of its de luxe range and the oven thermometer on the same model plays "Tenderly" when the meat is ready. This manufacturer is now marketing a water softener for use with its washer; calls it Wonderinse; will bring out a combination washer-dryer about March...Westinghouse drew in crowds with its electronic oven demonstrations; passed out white gloves at the door to let the spectators take part in "sand tests" on its laundry equipment... J. J. Lukanish gave out rabbits feet urging "Get lucky with Gibson;" showed a new de luxe refrigerator, an ice ejector on new models... Bendix models had been moved into the Philco booth following the merger...Kelvinator featured five air conditioner models, with several styles and sizes...Chambers had an electric model with a gas broiler.

To bring in customers

Celebrating National Electrical Week, PG and E and Northern California Electrical Bureau put on a $167,000 promotion; offered $20,000 worth of electrical prizes to lucky customers who deposited entry blanks in participating dealer stores. Running from Feb. 6 through March 11, the promotion offered, through a drawing, a $1,000 grand prize, 30 prizes up to $550 retail and 70 up to $60, all in electrical merchandise of the winner's choice. To qualify for the drawing, a person had to be a PG and E customer; to fill out an official entry blank telling what appliances he would like to win—type, make and model number. Window displays and store banners identified participating dealers.

Coming to San Diego

San Diego Bureau of Home Appliances will hold its Winter Conference on March 7, its Spring Fair from April 23-28. Speakers scheduled for the conference: L. C. Truesdell, Zenith vice-president and director of sales; E. B. Barnes, Kelvinator general sales manager; Anderson Borthwick, First National Trust & Savings Bank president.

A First for TAMA

TAMA is sponsoring its first training school, with classes on automatic washers starting Feb. 26 at Tucson High Vocational Building. The 72-hour course will enroll 15 maximum. Other classes will be formed if necessary. Tuition is $15 plus $2 for text books.

New League

The Mid-Columbia Electrical League held its first meeting in Pasco, Wash., Feb. 14. Charter members include Benton and Franklin County PUDs, Big Bend Electric Co-op, IBEW, Local 77, dealers, suppliers. Jack Criswell is acting secretary.

Housewares Show Planned

A Western Housewares Assn. has been formed and will hold a show concurrently with the Western Summer Market at San Francisco Merchandise Mart. President is Max P. Fisher of H. M. Johnston & Associates.

Also Air Conditioning

Western Air Conditioning Industries Assn. will stage its show at the Shrine Exposition Hall in Los Angeles, May 4-8. Manufacturers and distributors will display new products; panel sessions will emphasize the importance of modern new equipment, indicate potential increase in income from installations. The first three days are for the trade only; the last two for homeowners. Information may be secured from Fred J. Tabery, exhibit manager, 3443 S. Hill St., Los Angeles.

Home Shows Too

Home shows coming up: Snake River Valley Electrical Assn., June 6-9 in Boise, June 15-16 in Twin Falls, June 22-23 in Pocatello; Los Angeles Home Show, June 20-30 at Pan Pacific Auditorium, sponsored by 13 construction industries.

SMUD is Winner

Sacramento Municipal Utility District won the public utility award in General Electric's annual citations for achievement in the promotion of major electrical appliances. Judging in the national contest is on the basis of promotional accomplishments as reflected in increased appliance sales, average kwh use and sales costs. Carl L. Richey, assistant general manager, directs sales department activities.

A handy file folder

Idaho Power Co. is giving electrical dealers in its service area a sales promotion folder that serves as a calendar for advertising tie-in, a file for advertising proofs, mats and copy during the current month (for records, tear sheets, cooperative advertising claims later). The outside of the manila, letter-size file carries a sample ad for the month, LBE and Housepower symbols, gives last year's record in national averages and

for Snake River Valley. The inside bears the month's promotional calendar, with newspaper advertising and radio and TV programs scheduled.

Dryer service guide on press

A new teaching guide on automatic dryer servicing is on the press following seven months of hard work by a subcommittee of the Rocky Mountain Electrical League and Appliance Parts Jobbers Assn. Aud Hanna, Ray Jones Washing Machine Co., Denver, Leonard Bernecker, Public Service of Colorado, John Hamilton, Western Appliance Corp., and Leonard Smith, Emily Griffith Opportunity School, digested every scrap of information from the American Home Laundry Mfg. Assn., which cooperated fully, to develop the guide. Although developed for use in Denver's trade school appliance service classes, it will be widely used wherever similar appliance service training is conducted.

Disposers required

Denver City Council has approved an ordinance requiring all new dwellings to have garbage disposal units. The action followed a report by the city building department showing that 90% of all new residences already are being equipped with these electric units.

Merchandising bill killed

In Wyoming the House killed a bill that would have prohibited public utilities serving electricity or natural gas from wholesaling or retailing gas and electrical appliances. Proponents contended that some utilities were charging off the portion of their offices used for retail activities on utility expenses.

New Offices

Nearly 1,000 attended the distributor's open house at Packard-Bells' new service division building at 1916 S. Figueroa in Los Angeles. The new headquarters provides both expanded warehouse and service facilities.

Celebrating 52 years

Celebrating Hotpoint's 52 years of appliance making, "Giant Electrorama" broke in Portland Feb. 13 through a 24-page supplement to the Oregon Journal, carrying stories about appliances interspersed with dealer tie-in advertising. Mr. and Mrs. George Woodward of West Linn, Ore., who had been married 52 years in February, were crowned king and queen of the Electrorama. There's a contest and prizes, of course, $150,-000 in all, with a grand-prize all-expense trip to Hawaii. Each dealer store had a birthday cake every day of the week of Feb. 13, each visitor getting a piece containing a capsule with some kind of prize and maybe a chance at the grand prize.

Promoted

Stuart D. Paine, former executive vice-president, was made president of Thompson & Holmes, San Francisco distributor, last month. Melvin Pettis was named merchandising manager. Paine has been with the firm since 1947, Pettis since 1939.

Frank Falge's monthly progress report on

LIVE BETTER . . . *Electrically*

1957 Telecast goes over big

Universally enthusiastic reports to overflow audiences have been received from the West Coast cities where the closed-circuit telecast was held. Kinescopes have been delivered for local meetings.

The heat is on electric heat

Nationally electric heating is set for big things in 1957. For real comfortable living electric heat is hard to beat. With our moderate Western climate many fortunate people are already enjoying electric heat. For utilities with summer peaks, it offers an excellent medium for balancing the load.

Buyers of better homes in 1957 want to Live Better Electrically

Higher priced homes will receive greater emphasis and be in greater demand in 1957. This means that all-electric kitchens, all-electric laundries and other electrical innovations will be needed to help satisfy the greater consumer demands for Better Living—Electrically of course.

Opportunity knocks at our schools

Home economics departments of junior and senior high schools and colleges set the stage for the types of appliances that will be used by our housewives of tomorrow. Here is what one survey in two large California schools, one a senior high and the other a junior high, showed: 3 electric ranges, 7 years old; 12 gas ranges, one 8 years old, 11 12-15 years old; 3 electric refrigerators, 5-6 years old; one electric dryer, 6 years old; one automatic washer, 6 years old. Marketing managers—note for action!

Better light Better living electrically

The average home in 1955 had nine lighting fixtures worth $32.14 and this increased to 11 in 1956, says the American Home Lighting Institute. But a light-conditioned home of 1,200 sq ft needs 20 to 25 fixtures worth more than $360.

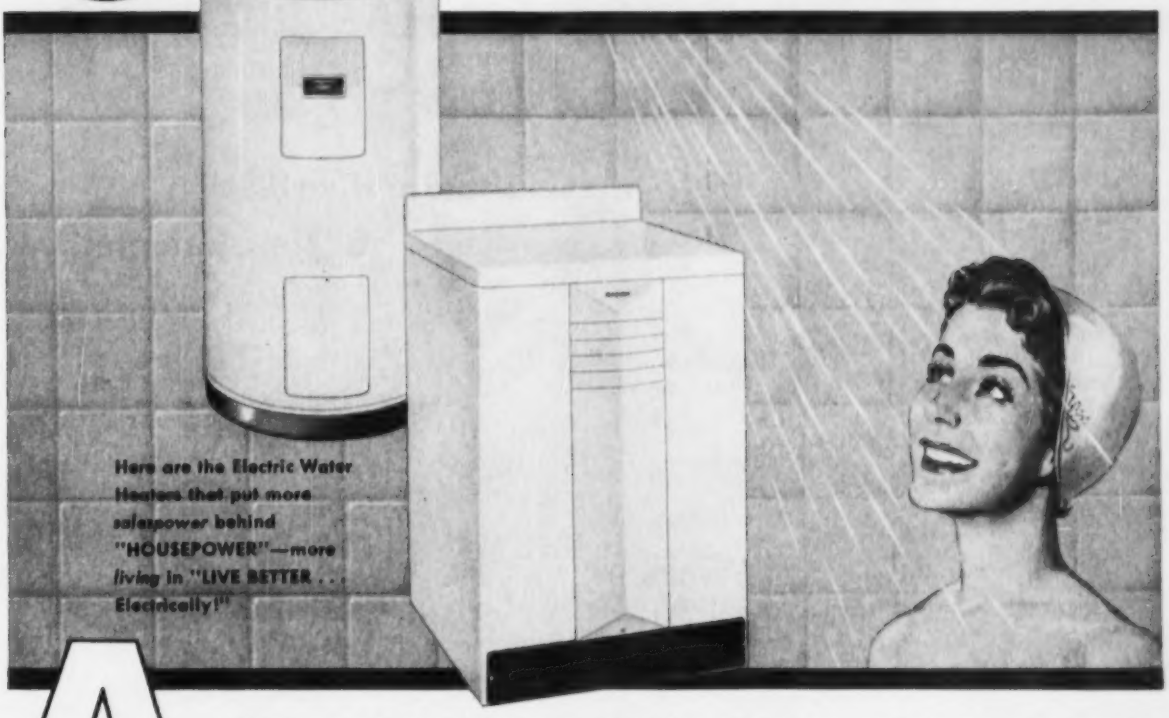
Still more electrical conveniences

An electric brush by Delightful Gifts, Box 51, Hillside, N. J. . . . A food slicer by General Slicing Machine Co., Walden, N.Y. . . . A mixer-sharpener-juicer by Westinghouse Corp., Mansfield, Ohio . . . A hot bed for dogs by S. G. Lipic Co., 201 S. Central, Clayton 5, Mo. . . . An electric wrist watch by Hamilton Watch Co.

Housepower ad kits containing suggested layouts, mats, drop-ins, illustrations, cartoons, news releases, etc., were supplied to all newspapers by Arizona Public Service Co. Details may be secured from Tom Keefe, publicity department.

HOUSEPOWER

question: Looking for a NEW Electric Water Heater Line?


Here are the Electric Water Heaters that put more salespower behind "HOUSEPOWER"—more living in "LIVE BETTER . . . Electrically!"

answer: HOTPOINT CONTINUES ITS FULL LINE OF INDUSTRY-LEADING WATER HEATERS TO MEET ALL LOAD BALANCING CONDITIONS!

maximum **public acceptance • engineering superiority • completeness of line**

⅓ of all Electric Water Heaters ever built have been built by Hotpoint!

They're easiest to sell—first choice in over one million American homes!

They're easiest to install—No tricky hook-ups. No long pipe runs. No special tools or skills needed.

Service is no problem—Only 3 out of every 1,000 Hotpoint Water Heaters have ever needed servicing of any kind!

Here are just a few of Hotpoint's outstanding features . . .

- Calrod® Magic Circle® heating units grip outside of tank with pressure of 200 pounds—heat is efficiently transmitted to water.
- Automatic Thermostats—mounted directly on tank for sensitive, accurate temperature control.
- Finest Fiber Insulation—permits storage of hot water for 3 days without heating.
- Copper hot water trap—"hot-dip" galvanized steel tank—cold water baffle—Listed by Underwriters' Laboratories, Inc.—full Hotpoint Warranty.

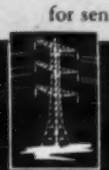
Also available are Quick-Recovery Super Speed models and cement-lined Perma-Stone models that can't rust.

Round models in sizes from 30 to 82 gallons.

Table-top models in 30, 40, 50 gallon sizes.

Built-In models in 30, 40, 50 gallon sizes. A real low-cost "Builder" unit that can be installed under kitchen counters, in bathrooms, linen closets, etc.

You'll build maximum water heater revenue by giving your customers the finest, most famous in Electric Water Heaters —so contact your Hotpoint Distributor today!



Again, Hotpoint looks at Tomorrow, Today!

RANGES • REFRIGERATORS • AUTOMATIC WASHERS • CLOTHES DRYERS • DISHWASHERS • DISPOSALS • WATER HEATERS • FOOD FREEZERS • AIR CONDITIONERS • CUSTOMLINE • TELEVISION

HOTPOINT CO. A Division of General Electric Company, 5600 West Taylor Street, Chicago 44, Illinois

Do you know this Kuhlman Salesman? *

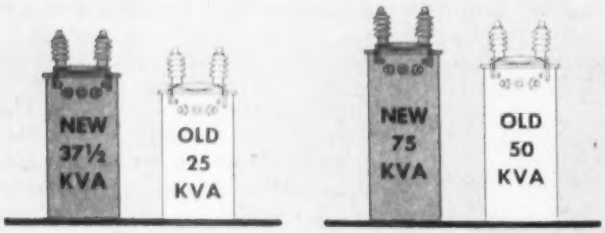
"You know Chuck:

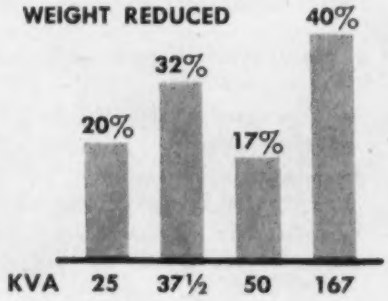
KUHLMAN HAS REDUCED WEIGHT UP TO 40%

Take these popular distribution transformer KVA sizes for example:"

During the last few years Kuhlman distribution transformers have been made lighter, smaller and shorter. They are easier to handle, require less storage space, and in the higher KVA ratings save the cost of larger poles.

This modern trend to lighter, more compact design was originally started by the Kuhlman Bent Iron Core more than 20 years ago. Today refinement of the "Bent Iron" principal has made even greater improvements possible. For example:





The 75 KVA transformer now requires the same pole as the old 50 KVA—the 100 KVA weighs approximately the same as the old 75 KVA. In fact, all popular ratings are substantially lighter, as shown in the above chart.

* KUHLMAN "Salesman of the Week"

If you can identify this Kuhlman Electric Co. representative, and are the first one to notify Dept. SA-1, Kuhlman Electric Co., Bay City, Michigan, you will receive a valuable gift certificate. Each week a different Kuhlman representative is featured . . . watch for the Kuhlman salesman who calls on you.

OLD 167 KVA NEW 167 KVA

SPECIAL FEATURES:

- ★ **Flat cooling tubes to reduce width.**
- ★ **Height reduced 31 inches—now the same as a 37½ KVA unit.**
- ★ **Designed for direct pole mounting.**
- ★ **Designed to replace a 75 or 100 KVA unit.**

Height has, also, been reduced. The most outstanding example is the 167 KVA which is 31 inches shorter and weighs around 1600 pounds. This unit can now be pole mounted in place of a 75 or 100 KVA unit to give additional capacity without the extra cost of installing heavier poles or platforms.

The 167 is only one of the many ways Kuhlman is meeting the need for shorter, lighter transformers. Ask for our price list PL-200A and check the latest in Kuhlman weights and dimensions.

"Not only weight, H. A., but:

HEIGHT HAS BEEN CUT 38%, TOO

Look at the big reduction on the 167 KVA:"

Who is this Kuhlman Salesman?

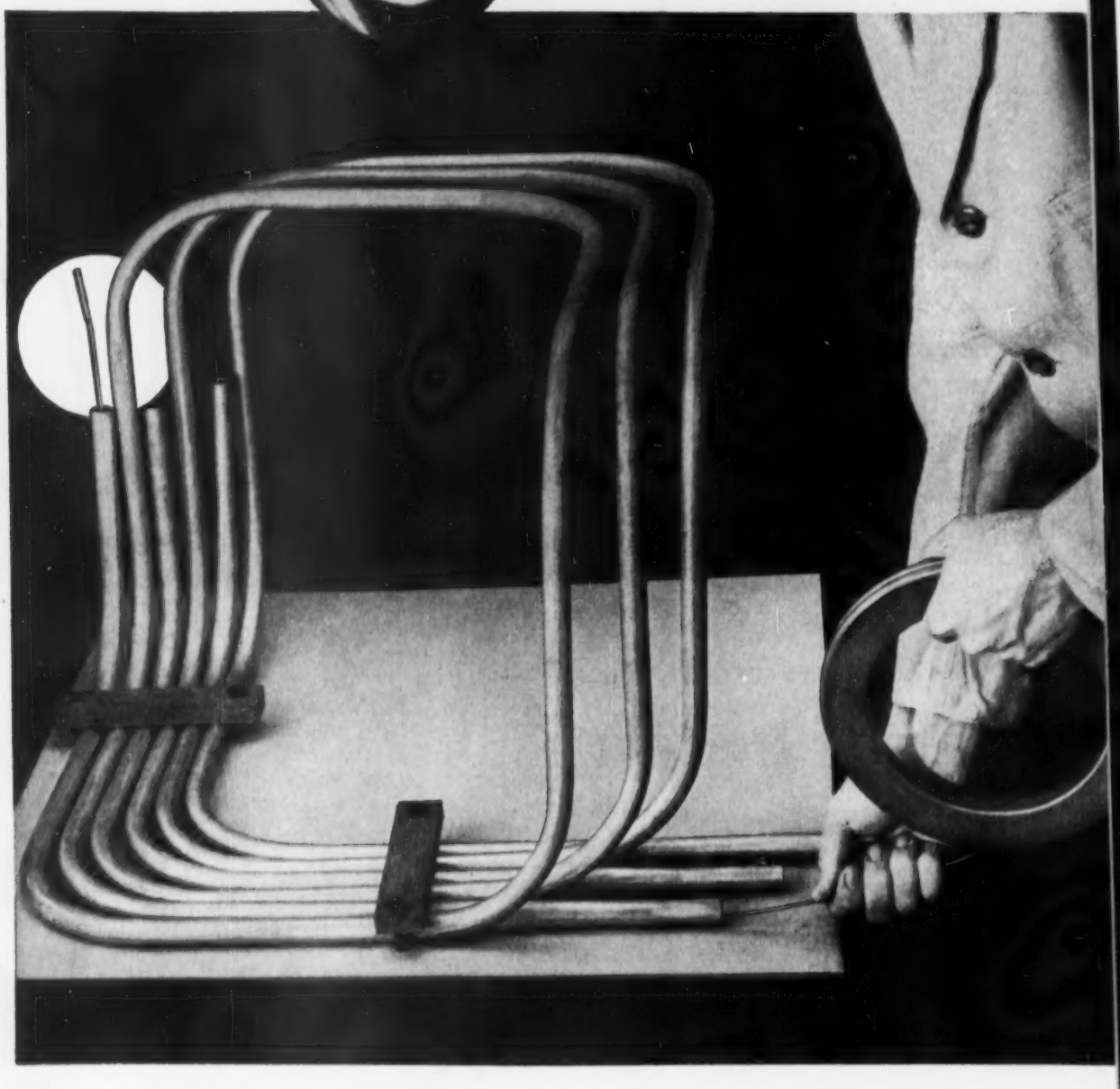
579a

KUHLMAN ELECTRIC COMPANY

DISTRIBUTED BY MAYDWELL & HARTZELL, INC. Seattle • Spokane • Portland • San Francisco • Los Angeles • San Diego • Phoenix

BAY CITY, MICHIGAN • CRYSTAL SPRINGS, MISSISSIPPI • SALINAS, CALIFORNIA

New Rome EMT



Fish-Tape Slips Right Through Rome EMT. No amount of forcing would get a ⅛-inch fish tape through two competitive lengths (behind Rome EMT). Here the same tape is shown as it slides right past all eight 90-degree bends in the Rome EMT.

proved best in fish-tape test

Actual comparison test proves Rome EMT easiest to fish

In recent tests, Rome Cable's EMT came out first in fishability. Disinterested observers checked the results with X-ray photos.

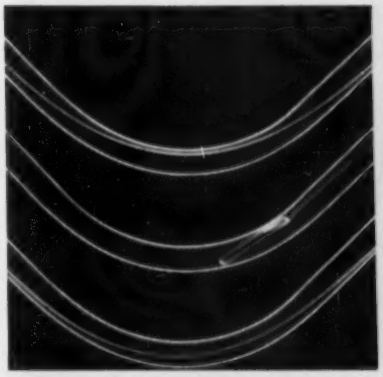
How the test was conducted:
Disregarding the National Electrical Code's limit of four bends, technicians bent a whole series of ten-foot lengths of ½-inch EMT into identical eight-turn runs for testing purposes.

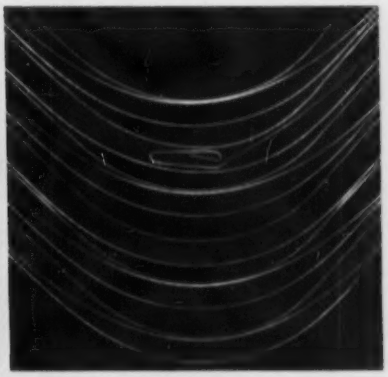
A standard ⅛-inch fish tape was then run into the test samples. It went easily through all eight bends in Rome EMT. In every competitive sample, the tape stuck fast at one of the bends!

Why Rome EMT is easiest to fish
A shiny new interior lets fish tapes slide through with an absolute minimum of resistance. Careful baking—under rigid control—puts a uniformly smooth enamel finish inside Rome EMT.

Test it yourself
Pick *any* competitive EMT, bend it identically with a length of Rome EMT, and then try the fish-tape test. You'll find that Rome Cable wins every time in this test of direct comparison.

Specify Rome EMT for your next job. Contact your nearest Rome Cable representative for more information—or write to Department 902, Rome Cable Corporation, Rome, N. Y.





Manufacturer "A" A ⅛-inch fish tape is being forced into this competitor's EMT. The X-ray photo (top) shows how the tape stuck fast on the fourth bend—as a result of a high-friction inside finish.

Manufacturer "B" The same fish tape is being run into another competitor's EMT. The X-ray photo shows the tape—stuck here on the seventh bend. Inside surface resistance caused this tape to stick.

Disinterested Observers from the Anstice Co., Inc., Rochester, N. Y., take X-ray photographs during tests. The photographing was witnessed by Chester Uffelman, Notary Public.

STOCK DISTRIBUTION CENTERS

Atlanta, Ga.
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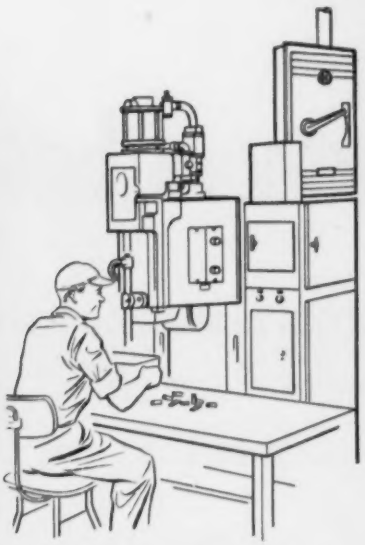
ROME CABLE
CORPORATION

MOLDED CASE CIRCUIT BREAKERS

Magnetic only type ETI circuit breakers are available in F, J, K, KL, L and M frames (3 to 800 amperes continuous ratings), 2 or 3 pole, 600 v a-c, 250 v d-c.



Typical resistance welder application of *magnetic only* type ETI circuit breakers in an individual enclosure.

Selective Short Circuit Protection for Motors and Resistance Welders

External instantaneous trip adjustment.

In motor control and resistance welding applications, adjustment of protective devices to a required setting is important. One of the many features of the ETI circuit breaker is its convenient externally adjustable magnetic trip device. When it is required to adjust the trip to a finer degree, adjustment is made from the front of the breaker without interrupting service or encountering live conductors. The range of instantaneous trip adjustment means greater protection for motors and resistance welders. When a short circuit occurs, all poles open simultaneously. And enclosed terminals protect personnel, yet permit easy cable connections. All these extra values in I-T-E Molded Case Circuit Breakers are yours at no extra cost. Send for complete information or contact your nearest I-T-E authorized distributor.

Typical motor control application of *magnetic only* type ETI circuit breakers.

Molded Case Circuit Breakers...added value at no extra cost

I-T-E CIRCUIT BREAKER COMPANY Small Air Circuit Breaker Division

19th & Hamilton Sts., Philadelphia 30, Pa.

*

THE KOREA TIMES

KOREA'S FIRST ENGLISH DAILY NEWSPAPER

Seoul, Republic of Korea

—EDITORIAL—

ALL NIGHT LIGHT SUPPLY AND CURFEW LIFT

In view of boosted electric power production, the Ministry of Commerce and Industry reportedly is contemplating a test operation, furnishing electric power to homes without restriction. It is now expected that a 24-hour power supply will be made available within two months.

Thus the oil lamps and candles will soon disappear from sight and we can enjoy bright nights. Government public offices and factories also will have a 24-hour power supply.

MASAN

SAMCHOK

TANGIN-RI

*Symbol of U.S. partnership in mutual security programs.

HANDS ACROSS THE PACIFIC

Under U.S. International Cooperation Administration sponsorship, Bechtel designed and constructed three steam-electric power plants for the Republic of Korea, nearly doubling that country's available generating capacity. Overall time for the plants, from grass roots to on-the-line, was less than two years.

BECHTEL CORPORATION • *Builders for Industry*
SAN FRANCISCO
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BECHTEL

Now Balanced Design in Allis-Chalmers

Engineered
to provide all the advantages you want and need

In the *balanced design* of Allis-Chalmers power transformers, each feature complements the others to provide outstanding dependability and long transformer life.

High Impulse Strength — Coil assemblies are designed to withstand repeated lightning and switching voltage surges without damage to the transformer.

Corona-Free Design — Keeps transformers young. Full insulation strength is maintained because transformer parts are kept free of corona's injurious effects.

Quiet Operation — Constant research in transformer noise has led to reduced sound levels in Allis-Chalmers transformers.

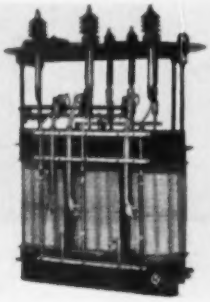
Reduced Size and Weight — Substantial reductions in height and weight simplify installation and relocation. Larger units can be shipped completely assembled.

High Short-Circuit Strength — In Allis-Chalmers transformers, circular coils are preshrunk and rigidly braced to withstand short-circuit conditions. Careful electrical balance of windings minimizes mechanical forces.

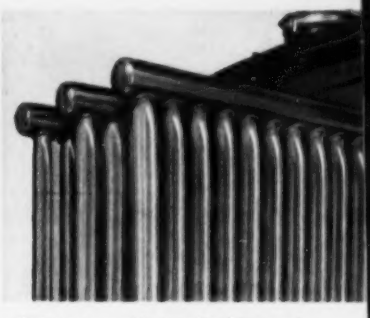
Get the complete "balanced design" story from your Allis-Chalmers representative. With a vast background of application engineering experience at his disposal, he will be glad to discuss transformer problems with you. Call your nearby Allis-Chalmers office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

Mechanical Strength...

One of the Many "Engineered-Together" Features of A-C Small and Medium Power Transformers



Side frame design locks core and coil assembly firmly to protect against short-circuit forces. Machine-wound insulating tubes provide rigid support for leads.

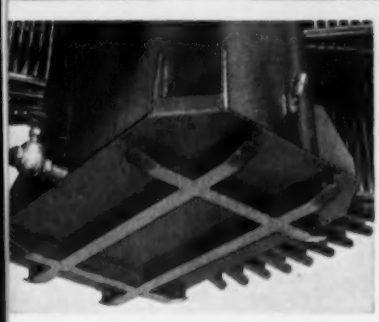


Radiator assembly is welded into tank wall to provide neat appearance and strong construction. Gasket maintenance is eliminated.

LIVE BETTER ELECTRICALLY

ALLIS-

Power Transformers



New base combines strength with utility. Heavy I-beam supports are turned upward at ends to allow sliding or rolling of transformer in any direction.

A-C CHALMERS

A-C ALLIS-CHALMERS

A-5149

NEW NICOPRESS NO. 88 TOOL with INTERCHANGEABLE HEADS

INTERCHANGEABLE HEADS ARE QUICKLY ATTACHED

● This mechanical tool develops tremendous power by a combination of compound leverage and progressive ratcheting action. A few short strokes of the easy-working handle produce the powerful jaw pressure necessary to assure dependable full-tension splices.

Quickly-changed tool heads permit splicing a wide range of larger conductors. Write for Bulletin 88.

NICOPRESS . . . the tool and the sleeve that are made to work together . . . *together* they make the perfect splice.

Nicopress Sleeves and Tools Patented in U.S. and Foreign Countries. "Nicopress" Registered in U.S. and foreign countries.

The National Telephone Supply Company

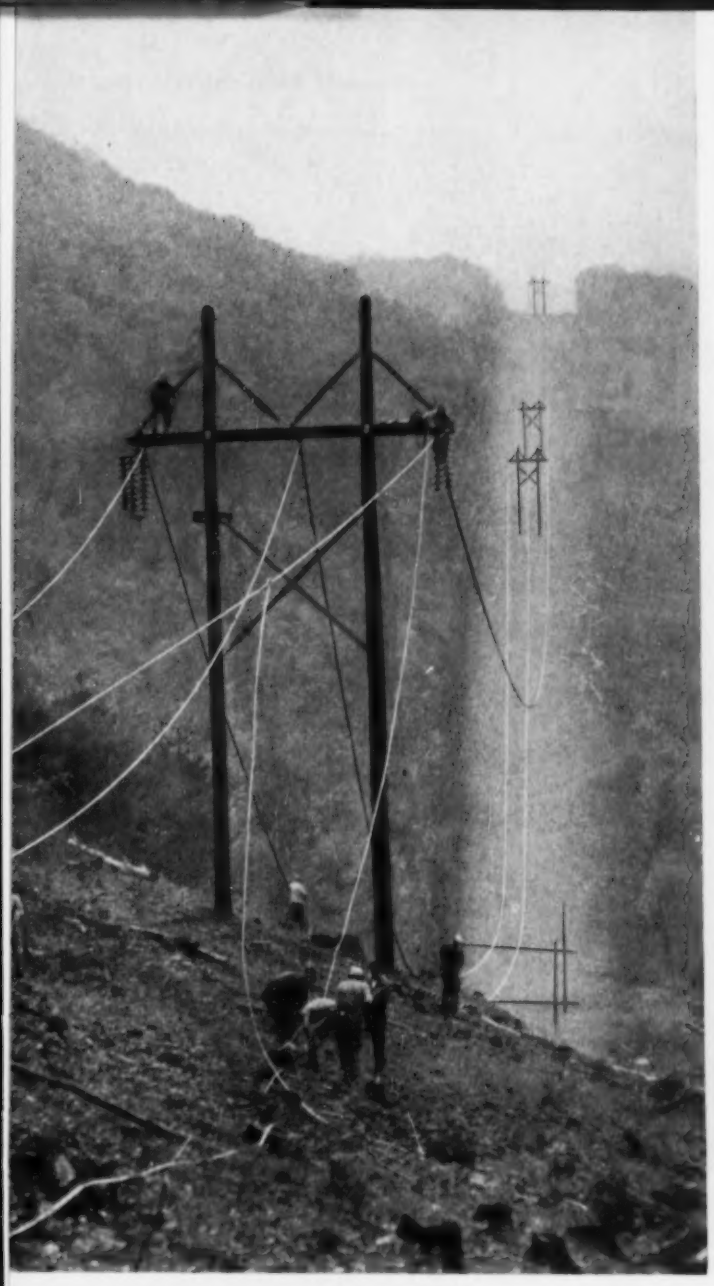
5100 SUPERIOR AVENUE • CLEVELAND 3, OHIO

Canadian Mfr.: N. SLATER CO., LTD., HAMILTON, ONTARIO, CANADA

Export Distributor: INTERNATIONAL STANDARD ELECTRIC CORP., NEW YORK, N. Y.

THE NATIONAL TELEPHONE SUPPLY COMPANY

A-5149



When a job calls for ACSR ...it calls for Anaconda cable experience

Producing top quality transmission cable requires more than a ready supply of metal—copper or aluminum. The most vital ingredient of good cable is the manufacturer's *cable experience*.

The choice of metals may change, depending on economic or other considerations. But cable requirements and the skills and knowledge involved in making dependable transmission lines do not. Whether copper or aluminum . . . it will pay you to call on the Man from Anaconda.

Backed by the broadest line of wire and cable in the industry, in both copper and aluminum, he is best qualified to help you arrive at the most practical and economical answer to your cable needs.

Multi-mill manufacturing facilities – strategically located across the country – assure speedy service. Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

FASTEST WESTERN SERVICE – At Orange, California, Anaconda's expanded, modernized mill fabricates and stocks copper and aluminum wire and cable for *every type of application*. Anaconda's Western Distributors thus can assure the fastest possible service on all West Coast needs. See Anaconda Sales Offices: Los Angeles, San Francisco, Seattle, Denver.

SEE THE MAN FROM ANACONDA®
FOR ALUMINUM WIRE AND CABLE

HIGHWAY FOR POWER. Anaconda 336.4 Mcm ACSR installed through rugged Catskill Mountains by New York State Electric & Gas Corporation.

LINEMAN *(below)*, standing near slowly revolving reels of cable, uses sound-powered phone to talk to cable-pulling crew about one-half mile away.

BULLDOZER *(lower left)* pulls cable from 4 or 5 reels up and over 5 pole dead end and on to the next H structure. "Cat" had to let itself down mountainside by winch.

57587

NEW, EXPANDED, STREAMLINED, AUTOMATIC DISTRIBUTION TRANSFORMER FACILITIES:

MOLONEY ELECTRIC COMPANY

NOW IN PRODUCTION

YES, now we are operating full scale at double our former production capacity to produce HyperCore Distribution Transformers in the quantities the utilities demand.

Here under this roof are the finest fabricating, assembling and automatic testing facilities in the industry. The capacity of these facilities insures that our warehouse stocks throughout the country can be maintained to insure delivery . . . in the quantities and ratings you desire . . . when you want it. Also . . . you get 100% pre-tested, pre-proved HyperCore Distribution Transformers that are now automatically tested.

Call your Moloney representative today. Check on immediate delivery from stock. Only Moloney HyperCore Transformers can offer you operating efficiency . . . 100% pre-tested and pre-proved.

M697-8

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Power Transformers • Distribution Transformers • Load Tap Changing Transformers • Regulating Transformers • Step Voltage Regulators • Primary Unit Substations • Secondary Unit Substation Transformers • Network Transformers • Series Street Lighting Transformers • Subway Transformers • Industrial Dry Type Transformers • Transformers and Inductors For Electronics

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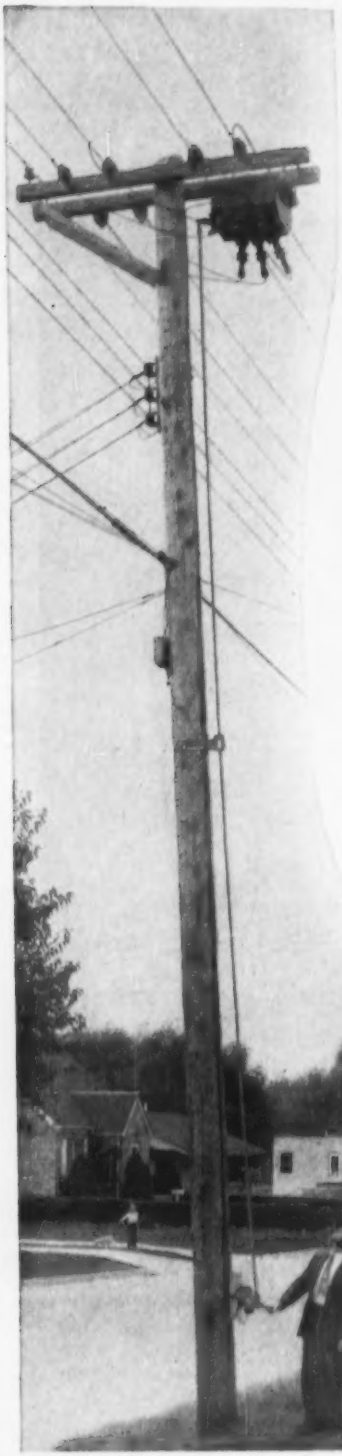
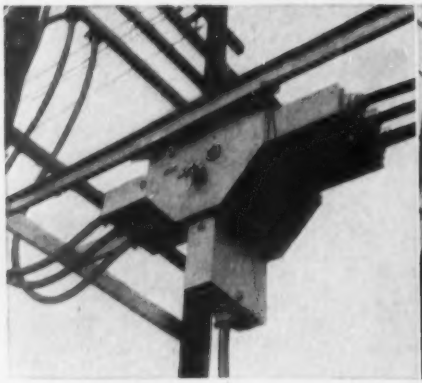
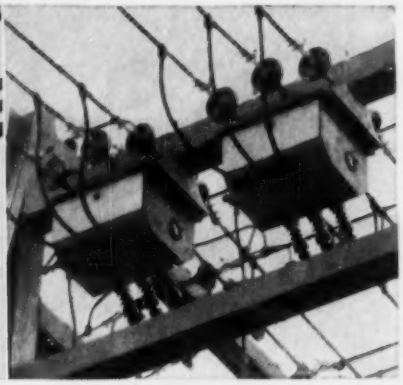
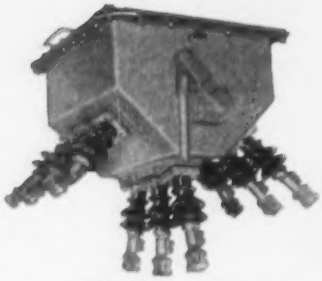








"ORA" *Single Throw*

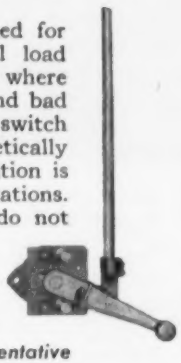
"ORAD" *Double Throw*

for full load break sectionalizing of overhead circuits

***install* G&W TYPE "ORA" OIL SWITCHES**

SWITCHING CONTACTS IN OIL FOR PROTECTION AGAINST CORROSION

Type "ORA" oil switches are recommended for sectionalizing overhead circuits when full load break disconnection is an advantage and where protection against atmospheric corrosion and bad weather conditions is important. With all switch links and contacts oil immersed in hermetically sealed tanks, permanent trouble-free operation is assured under normal and emergency situations. Snow, ice, rain, or temperature extremes do not affect the operation.



400 AMPERES—5 Kv. and 15 Kv.

Write us or get in touch with our nearest representative for further information.

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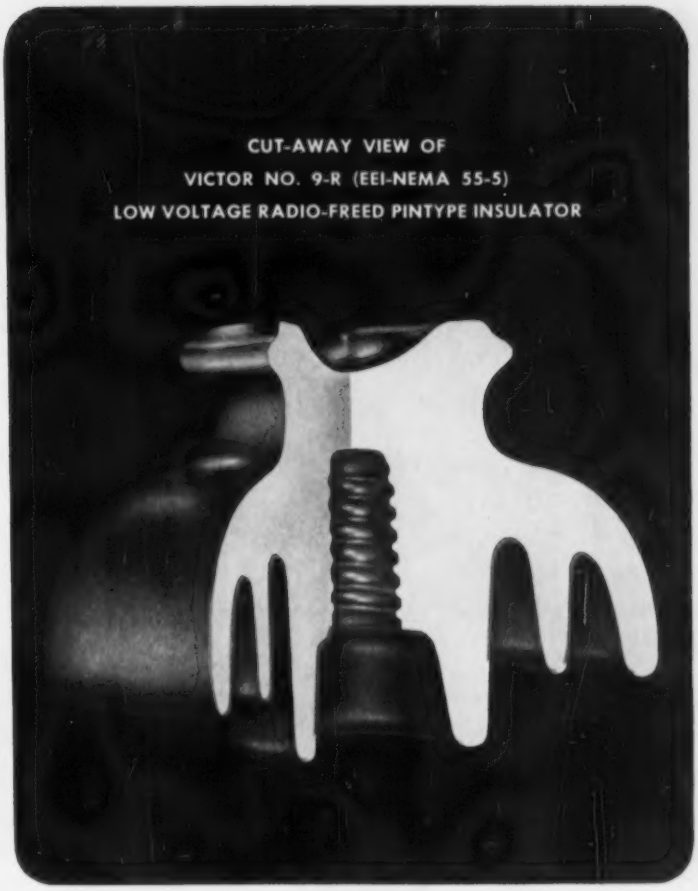
D574

G&W

High Voltage Cable Terminating, Sectionalizing, Protecting, and Connecting Devices

POTHEADS • BOXES • OIL FUSE CUTOUTS • LOAD BREAK OIL SWITCHES • SPLICING KITS



NO INSULATOR IS MADE WITH GREATER CARE THAN A *VICTOR* PINTYPE!

VICTOR Pintypes are designed and manufactured with the same *Purified* Porcelain as high voltage units. VICTOR Pintypes are design-tested with steep front impulse wave in addition to the normal 1.5 x 40 standard impulse wave.

The conductive glaze on VICTOR radio-freed units is readily *distinguishable* and *permanent*. Accurate, die-formed porcelain threads assure ease of installation. Machine glazing guarantees uniform glaze application, giving optimum dielectric and mechanical strength. *Every* VICTOR Pintype receives the same careful routine electrical testing as VICTOR high voltage insulators. That's why—when you buy VICTOR, you just can't buy better pintypes.

New . . .

VICTOR CATALOG

Now ready for distribution is Victor's newest and most extensive catalog. One of the most complete in the field, it includes illustrations and data on many items being produced at VICTOR and not previously shown, up-to-date EEI-NEMA Standards, and an outline of VICTOR'S new plant, research, testing and manufacturing facilities. It's FREE! Write for your copy.

Nothing beats Porcelain

FOR ELECTRICAL INSULATORS!

VICTOR INSULATORS DIVISION

I-T-E CIRCUIT BREAKER CO., Inc.

VICTOR, N.Y.

Now available from your jobber!

Reg. U.S. Pat. Off.

SCOTCHLOK Type R

BRAND

Electrical Spring Connectors

With "live" Spring Action!

The "live" spring action of new "SCOTCHLOK" Type R Connectors holds wires in a bulldog grip. The *feel* of turning on a "SCOTCHLOK" is a sound test of its holding power. Here's everything you need for a one-step pig-tail: positive, vibration-proof connection; reinforcing steel shell; tough, pre-insulated vinyl cover; and a neat, compact splice.

FEEL THE GRIP! TRY TO PULL THEM OFF!

Send For Free Samples! See for yourself how good "SCOTCHLOK" Brand Type R Connectors really are! Just write on your letterhead and we'll send you free samples for testing. Address: 3M Company, St. Paul 6, Minn., Dept. BU-37

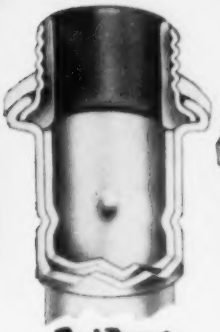
The term "SCOTCHLOK" is a registered trademark of Minnesota Mining and Manufacturing Co., St. Paul 6, Minn. Export Sales Office: 99 Park Ave., New York 16, N. Y. In Canada: P. O. Box 757, London, Ontario.

PRODUCTS BY 3M RESEARCH

B-M

the original concrete-tight **INDENTER FITTINGS** *for E.M.T.*

Red Throat
Insulated Connector



Red Throat
Cross section

"BM" #100
Cutter for ½, ¾ and 1" E.M.T.

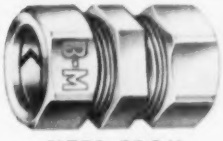
"BM" #1000
Holder for ½, ¾ and 1" E.M.T.

"BM" #607
½" Indenter

"BM" #600
Changeable Jaw Indenter

Briegel Rain-Tight E.M.T. Compression Fittings

SIZES FROM
½" to 2"



SIZES FROM
½" to 2"

SIZES
½", ¾", 1"

SIZES
½", ¾", 1", 1¼"

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UL

All B-M Indenter Fittings are U.L. Approved as concrete-tight and all Compression Fittings as rain-tight as well as for general use (File Card E10863). Also comply With Federal Specifications W-F-406.

TELESCOPE BM SYSTEM

BRIEGEL METHOD TOOL CO.

GALVA, • ILLINOIS

SOLD ONLY THROUGH ELECTRICAL WHOLESALERS

NEWEST REASON WHY ALL TRANSFORMERS ARE NOT ALIKE

Aluminum windings can take it!

Three-year field tests of experimental General Electric distribution transformers prove that aluminum windings have what it takes in case future emergencies tie up copper supplies.

Today 134 unique General Electric distribution transformers, like those shown above, are up on poles across the nation. What's unique? Their windings are *aluminum*.

Field tests prove success

The experimental, aluminum-wound units are the result of 18 months of General Electric research, development and manufacture. Now they have passed their three-year field tests. Utility comments such as "no operating difficulties," "performing satisfactorily," and "no troubles whatsoever" underline the aluminum winding's success.

Exceeds NEMA standards

Experimenting with one of the field-tested units back at the plant, General Electric engineers found that the aluminum winding meet all the standards set for conventional transformers, and greatly exceed NEMA requirements for a new unit. G-E engineering research had met the challenge: the aluminum-wound transformer is a success.

G.E. solved complicated problem

When the problem was first tackled, G.E. decided that the aluminum-coil transformer must meet present electrical and mechanical requirements in spite of the widely different characteristics of copper and aluminum. The problem of thus balancing a lighter-weight conductor with lower conductivity had to be solved; new methods of wire drawing and rolling and coil winding had to be developed; and new brazing and welding techniques adopted. Yet in spite of these difficulties, G-E engineers developed an aluminum-wound transformer. In most ratings, it is virtually an exact size-for-size, weight-for-weight replica of its copper-wound prototype with essentially the same losses and regulation.

AL/CU terminals: early development

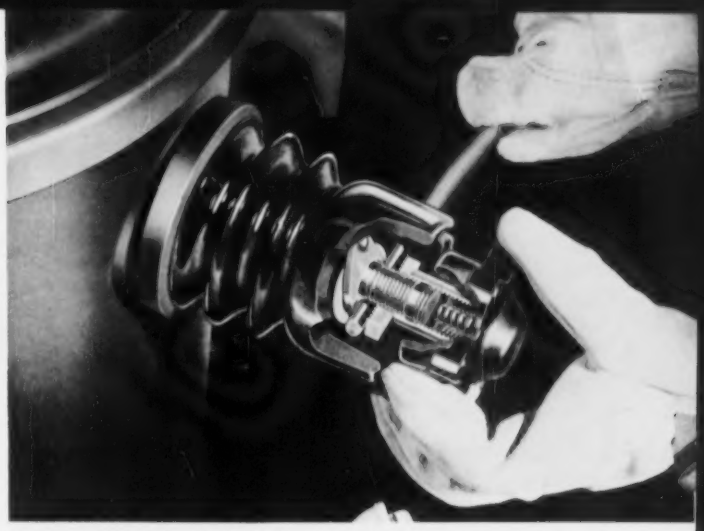
When utilities began to consider seriously the use of aluminum line conductors, G.E. recognized that new methods would be needed to tie transformers into the lines. For the "cold-flow" of aluminum causes conventional terminals to loosen. The AL/CU terminal clamp developed by G.E. solves the problem by exerting a constant pressure on the conductor.

All Transformers Are Not Alike

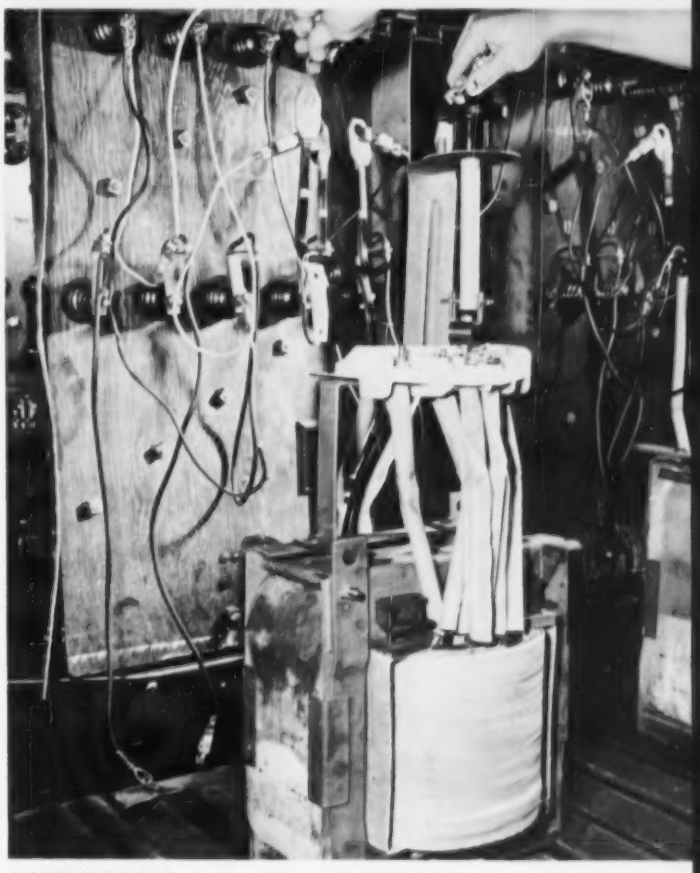
Continued research is only one advantage of General Electric Distribution Transformers. Others include *Formex* wire* for reduction in tank size, *new and improved circuit breakers* for self-protected transformers, *complete warehouse stocks* to save utility inventories, and many others—evidence that all transformers are not alike.

For complete information contact your nearest G-E Apparatus Sales Office or write to Section 431-52 General Electric Company, Schenectady 5, New York. 431-52

*Reg. Trademark of General Electric Co.



AL/CU TERMINALS on G-E high-voltage bushings save costly service trips by keeping a tight grip on conductors in spite of "cold-flow".



ALUMINUM COIL has passed severe field and factory tests, proving aluminum has what it takes in case copper becomes unavailable.

Progress Is Our Most Important Product

GENERAL ELECTRIC

WHITEWAYS | DOWNTOWN | PRIMARY TRAFFIC | SECONDARY TRAFFIC | RESIDENTIAL

FILAMENT LUMINAIRES, the type in greatest use today, are lowest in initial cost, highly flexible, and offer good color quality.

MERCURY LUMINAIRES, often used to attain the higher illumination levels, are characterized by long lamp life, high lamp efficiency.

FLUORESCENT LUMINAIRES offer superior visibility, fine color, low glare, long lamp life, low maintenance, and low power consumption.

General Electric offers all 3 luminaire types to assure best lighting for every street

In attacking your street lighting problems, you naturally want all the available tools to select from. Such choice is automatic when you work with General Electric, because G. E. offers complete luminaire lines (and years of experience in applying each) for all three light sources: filament, fluorescent, and mercury.

This means two important things to you: First, no matter what type of street, or what special conditions exist, your General Electric representative can draw on these years of experience in advising you. Second, the advice you get will be impartial—based on engineering and economic facts—since G. E., as a full-line manufacturer, has no reason to favor one type of lighting over another.

VISION-ENGINEERED SYSTEMS

Let G. E. help your street lighting program on a ***vision-engineered system*** basis. On every lighting project, regardless of size or type, General Electric offers you:

PROJECT RESPONSIBILITY—one source of supply for *all* your street lighting needs, including complete control and auxiliary equipment as well as luminaires.

COMPLETE ENGINEERING ASSISTANCE—expert start-to-finish aid from field and factory lighting specialists.

RESEARCH LEADERSHIP—the industry's newest and most complete laboratory, development, and proving facilities are located at G.E.'s "Outdoor Lighting Center of the World" in Hendersonville, N. C.

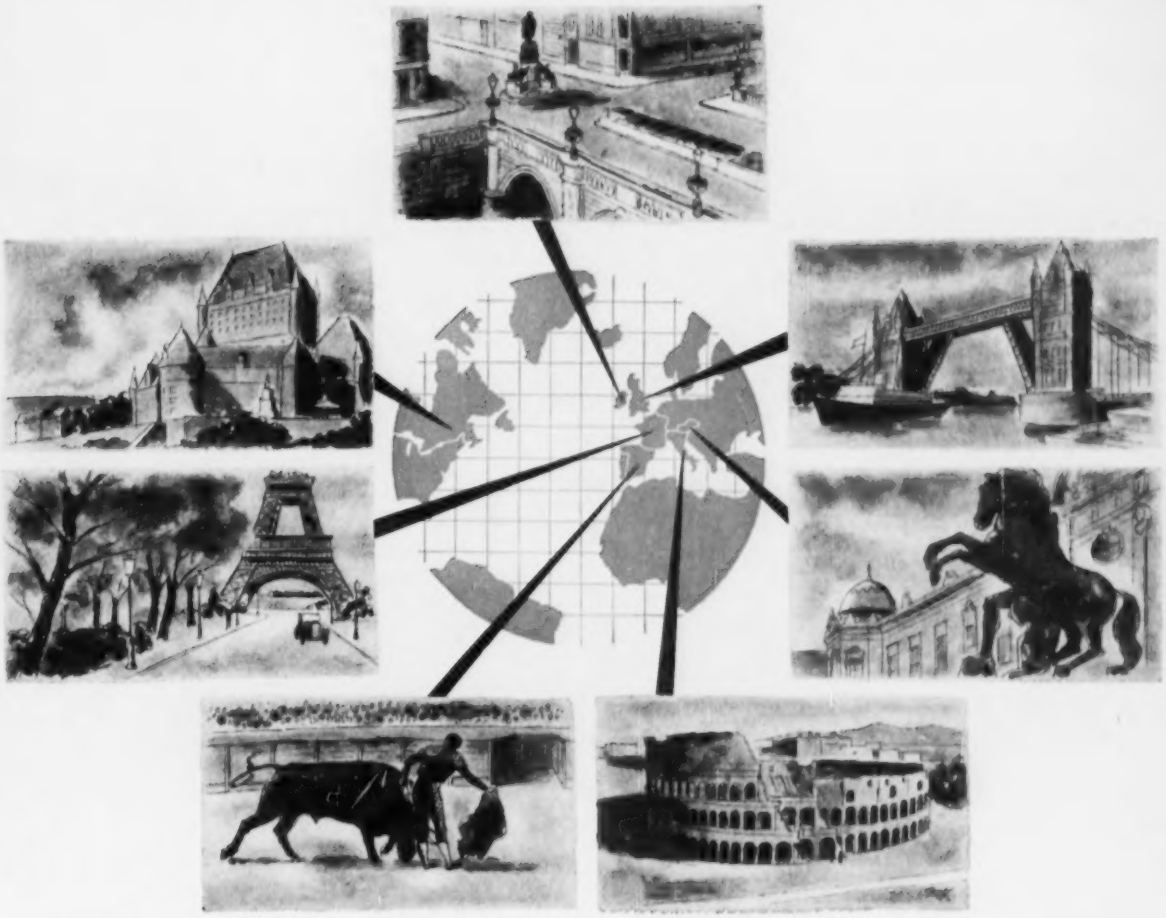
Get the full ***vision-engineered system*** story from your nearest Apparatus Sales Office or authorized agent! General Electric Co., Schenectady, N.Y.

LIVE BETTER ELECTRICALLY

452-167

VISION-ENGINEERED STREET LIGHTING SYSTEMS

GENERAL ELECTRIC



Here, too, we make Nichrome*

Perhaps you didn't know that the world-famous alloy Nichrome is produced not only in The United States, but also in 6 Driver-Harris plants in England, Ireland, France, Italy, Austria, Spain, and in Canada by The B. Greening Wire Company. Also, Nichrome is a registered trade-mark in 55 nations.

At first, fifty-odd years ago, we manufactured electrical resistance alloys for furnace elements and domestic heating appliances only. Today we produce 132 different high nickel alloys in many different forms and in hundreds of sizes, for almost every kind of domestic and industrial application—of which Nichrome is the most illustrious.

Whenever you buy Nichrome, you are assured of the unsurpassed and unvarying *quality* which has made Nichrome the supreme world standard for electrical-resistance and heat-resistant alloys. This uniformly high quality, which we jealously guard as our most priceless possession, results from the technical excellence, the productive skill, and the quality controls the Driver-Harris craftsmen have gained in over 50 years of experience—and which are maintained with equal rigor in all Driver-Harris plants here and abroad. The result is a continuous benefit to the entire electrical, electronic, and heat-treating industries.

*T.M. Reg. U. S. Pat. Off.

Nichrome is made only by

Driver-Harris COMPANY HARRISON, NEW JERSEY

Manufacturing plants also in: ENGLAND • CANADA • IRELAND • FRANCE • ITALY • AUSTRIA • SPAIN

MAKERS OF THE MOST COMPLETE LINE OF ALLOYS FOR THE ELECTRICAL, ELECTRONIC, AND HEAT-TREATING INDUSTRIES

A question for every electric utility

CAN LOAD GROWTH BE HANDLED WITH LOWER INVESTMENT COSTS?

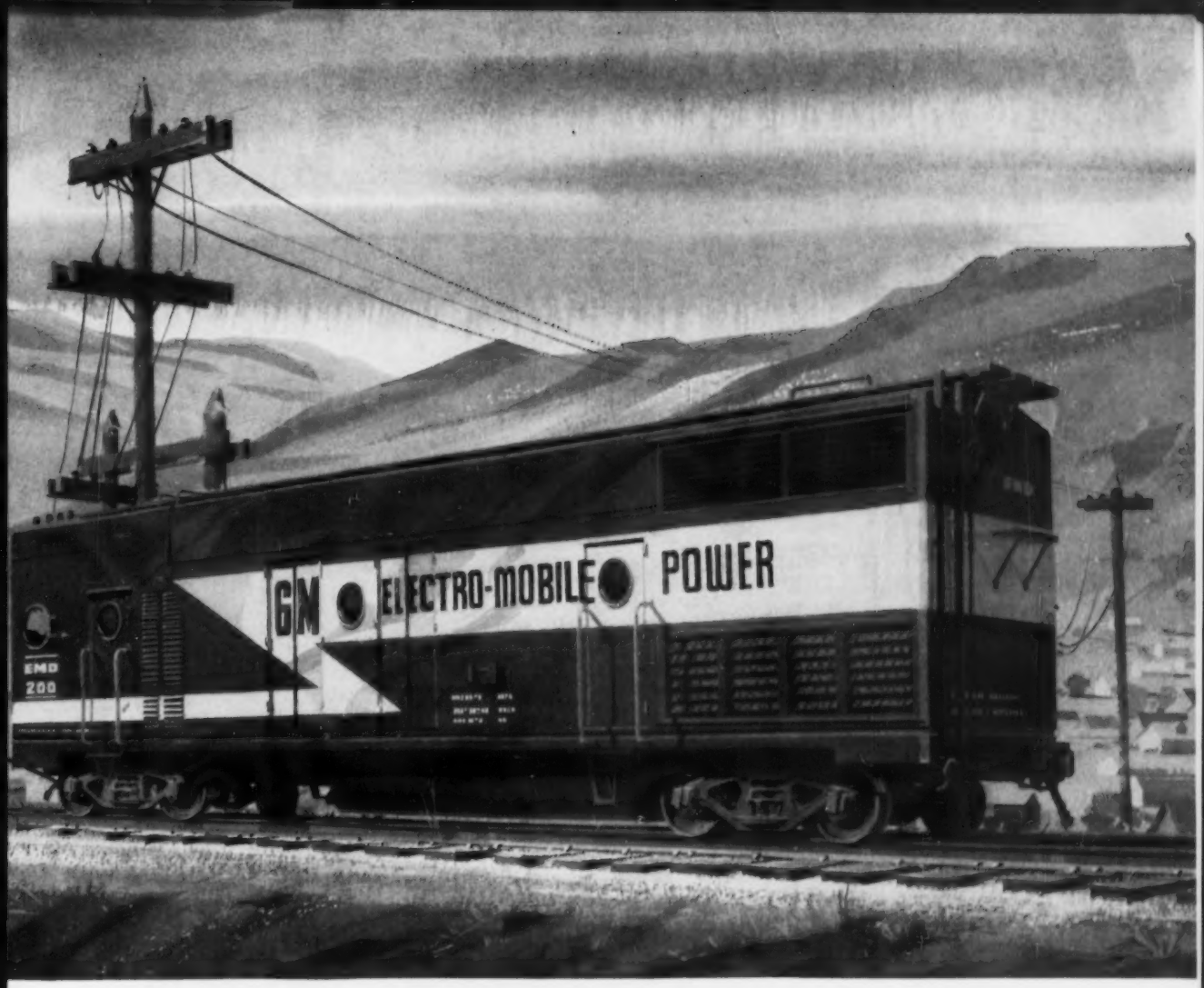
Our unequivocal answer to this question is, "Yes . . . and with greater power flexibility too."

Demand for electric power cannot always be controlled. Today's budding load growth area may well fall short of tomorrow's expectations.

The point is this: planning for increased power facilities necessarily precedes potential requirements by two to three years. Must, that is, unless a method can be devised that will permit the economic employment of units of power to handle load requirements as they develop, thus permitting a more realistic, longer-range selection of site and size for permanent installations.

Electro-Mobile Power provides the base for just such a program. It can be moved from one load center to another. It can be used in multiples to handle either building or diminishing demand. In short, it can follow the demand until such time as it becomes economic to build permanent facilities in the most advantageous location.

Can load growth be handled with lower investment costs? We think joint analysis of your own growth plans is the shortest way to an affirmative answer. Let's discuss it. Contact your nearest Electro-Motive representative for details.



As demand increases in the load growth area, Electro-Mobile rail units like this can be added or subtracted in 1000 kw increments to match power requirements exactly, at lowest cost. After demand has been established, permanent facilities can be erected in the most economical and desirable location. Electro-Mobile units offer the most advanced electrical engineering, equipment and controls. Rail units may be placed on sidings as shown here or mounted on piers for semi-permanent use.

Electro-Mobile trailer unit is remarkably adaptable to many temporary uses because of its quick mobility. Trailer units have 500 kilowatt capacity.

ELECTRO-MOTIVE DIVISION
GENERAL MOTORS LA GRANGE, ILLINOIS

Sales Offices in Chicago, New York, St. Louis, San Francisco

This Modern Building Has Life-time Wiring Protection -- Thanks to

YOUNGSTOWN "BUCKEYE" CONDUIT

First National Building, Tulsa, Okla.
Owner: Fifth and Boston Corp., Tulsa, Okla.
Architect: Carson & Lundin, New York, N. Y.
General Contractor: Manhattan Construction Co., Muskogee, Okla.
Electrical Contractor: Western Division of J. Livingston Co., St. Louis, Mo.
Conduit Supplier: Westinghouse Electric Supply Co., Tulsa, Okla.

Fifth and Boston Corporation's strikingly beautiful First National Building at Tulsa, Oklahoma, utilizes quality-controlled Youngstown "Buckeye" Black Enameled Full Weight Rigid Steel Conduit exclusively, for protection of its all-important electrical wiring system.

Nationally-known building owners, leading contractors and progressive architects realize that electrical systems that don't function safely and efficiently are definitely a bad investment. So to guard against this costly condition they specify Youngstown "Buckeye" Conduit for its long, trouble-free service life.

"Buckeye" Conduit is easy to fabricate on the job—easy to fish wires through—and thoroughly corrosion-resistant to damaging elements such as water, moisture, vapor, dust and dirt.

Leading distributors in every industrial and electrical market are ready to serve you quickly from their ample stocks. They're as near as your phone—why not call today?

Standard-threaded rigid steel conduit is the only wiring system approved today by the National Electrical Code as moisture-, vapor-, dust- and explosion-proof for use in hazardous locations and occupancies.

QUALITY YOUNGSTOWN SERVICE

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel

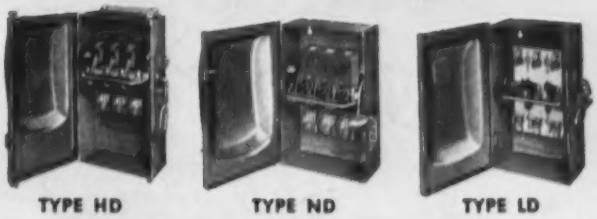
General Offices - Youngstown 1, Ohio

District Sales Offices in Principal Cities

FIRST with a COMPLETE LINE OF SAFETY SWITCHES to meet the NEW NEMA STANDARDS

• The table below shows Square D switches meeting new industry specifications. Notice how they clarify conflicting features which existed under old designations. Notice, too, that they establish a new, heavy-duty industrial switch, Type HD.

One important thing which remains unchanged is the **DESIGN LEADERSHIP** which has made **SQUARE D SAFETY SWITCHES** industry's overwhelming **FIRST** choice for more than fifty years. Compare them, feature for feature. They cost no more, why settle for less?



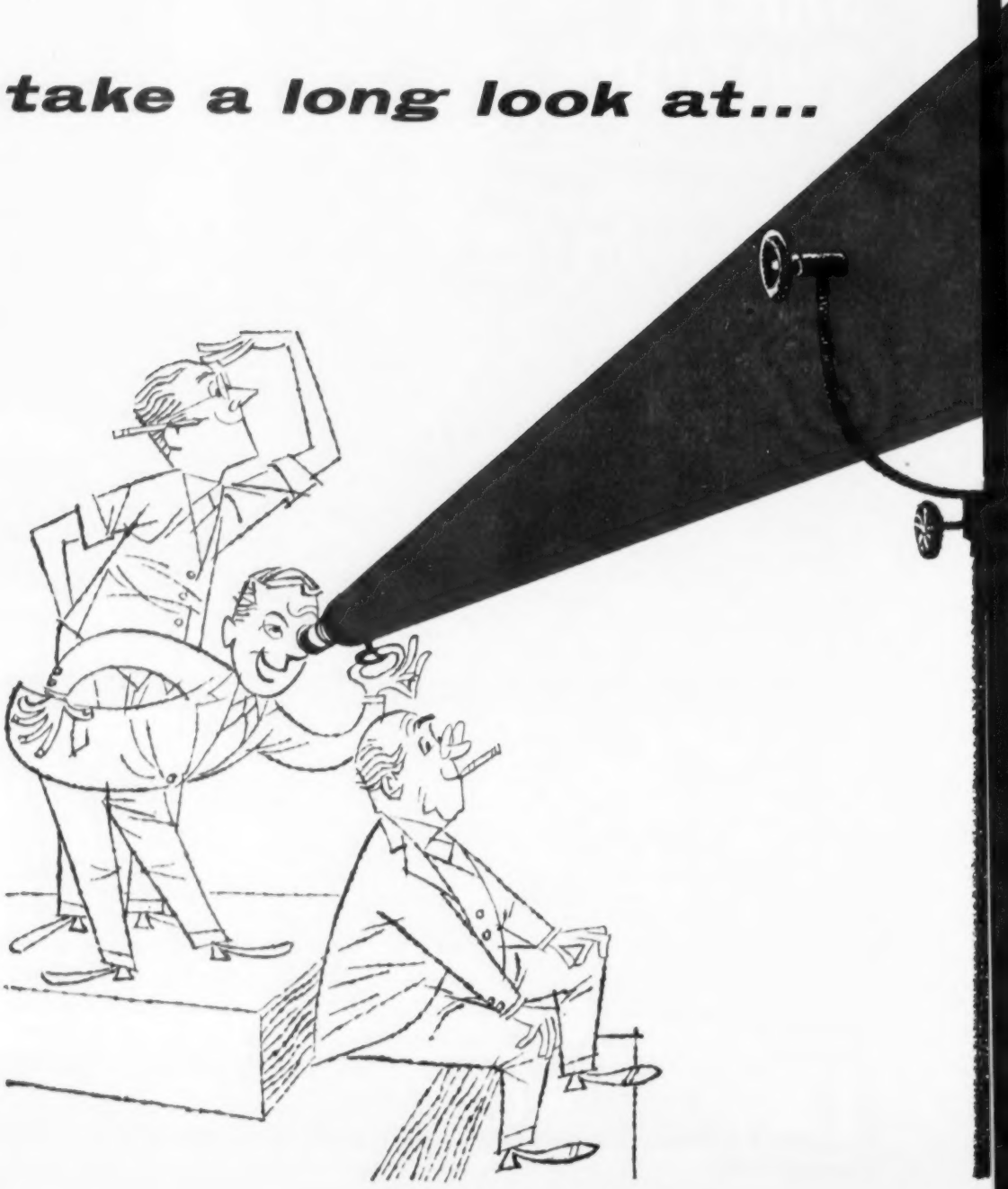
TYPE HD TYPE ND TYPE LD

DESCRIPTION	HEAVY DUTY New	NORMAL DUTY formerly Types H, S, or A	LIGHT DUTY formerly Types D or G
Rating-Ampere Voltage	30—600 250 or 600V AC, DC	30—1200 250 or 600V AC, DC	30—200 250V AC
Enclosure	NEMA 12 • Industrial Use (Gasketed) NEMA 4 & 5 • Water-tight & Dust-tight NEMA 7 • Explosion-resisting Class I—Group D NEMA 9 • Explosion-resisting	NEMA 1 • General Purpose NEMA 3R • Raintight	NEMA 1 • General Purpose NEMA 3R • Raintight
Horsepower Rating	NEC Fuse Ratings Dual-Element Fuse Ratings	NEC Fuse Rating Dual-Element Fuse Ratings	NEC Fuse Rating
Operating Mechanism	Quick-Make, Quick-Break Independent of Handle	Quick-Make, Quick-Break Independent of Handle	Positive Make, Positive Break Spring Assisted
Cover	Interlocked & Padlock Attachment	Interlocked & Padlock Attachment	Padlock Attachment
Plating—Current Parts	Extra-Heavy Silver	Silver	
Endurance	Maximum Endurance Far Exceeds UL Standards	Exceeds UL Standards	Meets UL Standards

NOW...EC&M PRODUCTS ARE A PART OF THE SQUARE D LINE!

SQUARE D COMPANY

take a long look at...



meter economics

You can effect prompt and progressive savings by standardizing now on the *meter of the future* — the Westinghouse Lifetime 30-ampere, single-phase meter. With full 200-ampere extended range, it will measure all present and future single-phase residential loads that can be provided on single-phase service, and *it is guaranteed for 30 years.*

This year, 57% of the single-phase watthour meters purchased and installed by the Electric Utility Industry represented change-outs due to obsolescence in the face of growing load. The other 43% went on new homes with high initial loads and rapid growth potential.

This new 30-ampere Westinghouse meter certainly is the meter for this year — and '66 — and '76 — and even '86. First, consider the value of simplified inventory — if you standardized! Then take notice that there is *not one cent more investment,* initially, *than for modern 15-ampere ratings.* There's no mathematical trick. Call your Westinghouse sales office, or your Westinghouse meter specialist . . . or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-40492

YOU CAN BE SURE...IF IT'S

Westinghouse

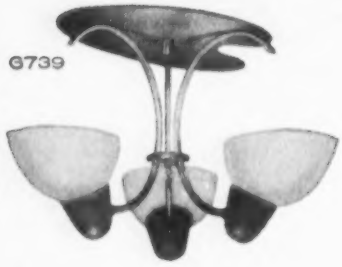
ready for immediate delivery!

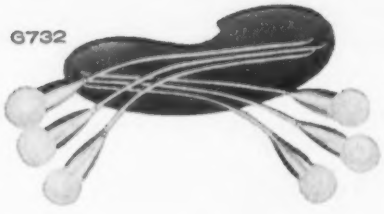
new money makers

You can get excited about these new additions to the Globe lighting line. Designed for dining areas, they feature new approaches in finishes . . . construction . . . illumination.
Specified in new construction, they make homes more salable.
In remodeling, they'll clinch contracts. These outstanding lighting fixtures have "sell" and "satisfaction" built right into them.
And you can have them immediately! Call for your Globe salesman. He will show you the complete new Spring line.

IT'S EASIER TO SELL GLOBE THAN TO SELL AGAINST IT!

from GLOBE

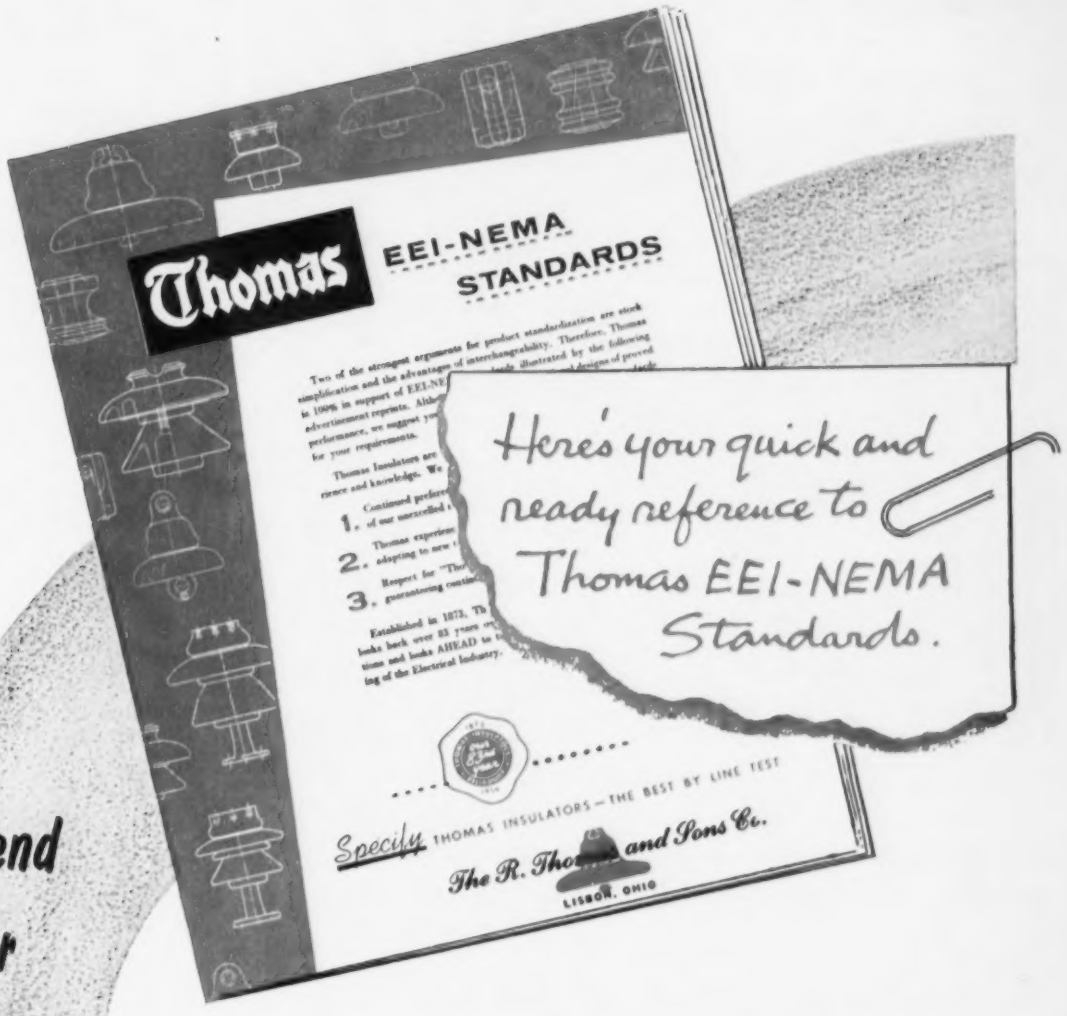




Ready Now! New four-color brochure R-156 with Globe's most popular numbers from our recent catalog. *And*—the new Globe Recessed Lighting Catalog showing many patented features. *Write today!*

GLOBE LIGHTING PRODUCTS, INC., 1710 Flushing Ave., Bklyn. 37, N. Y. • Visit our showrooms: 16 E. 40 St., N. Y. 16 • Over 500 fixtures on display.

"FOR OVER A THIRD OF A CENTURY, PLANNED LIGHTING FOR BETTER LIVING"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EEI-NEMA
STANDARDS
Here's your quick and ready reference to Thomas EEI-NEMA Standards.
Specify THOMAS INSULATORS—THE BEST BY LINE TEST
The R. Thomas and Sons Co.
LISBON, OHIO

Send for Your Free Copy Today . . .

The complete line of THOMAS EEI-NEMA PORCELAIN INSULATOR STANDARDS is illustrated and identified both by EEI-NEMA Class Numbers and by THOMAS Catalog Numbers.

This new eight-page bulletin is the kind of ready reference you'll want at your fingertips — for convenience in selecting and ordering standard SUSPENSION, PIN-TYPE, APPARATUS, GUY-STRAIN or SPOOL Insulators for all applications.

THE R. THOMAS & SONS CO.
Lisbon, Ohio

Gentlemen: Please send my copy of the new THOMAS EEI-NEMA Standards Bulletin.

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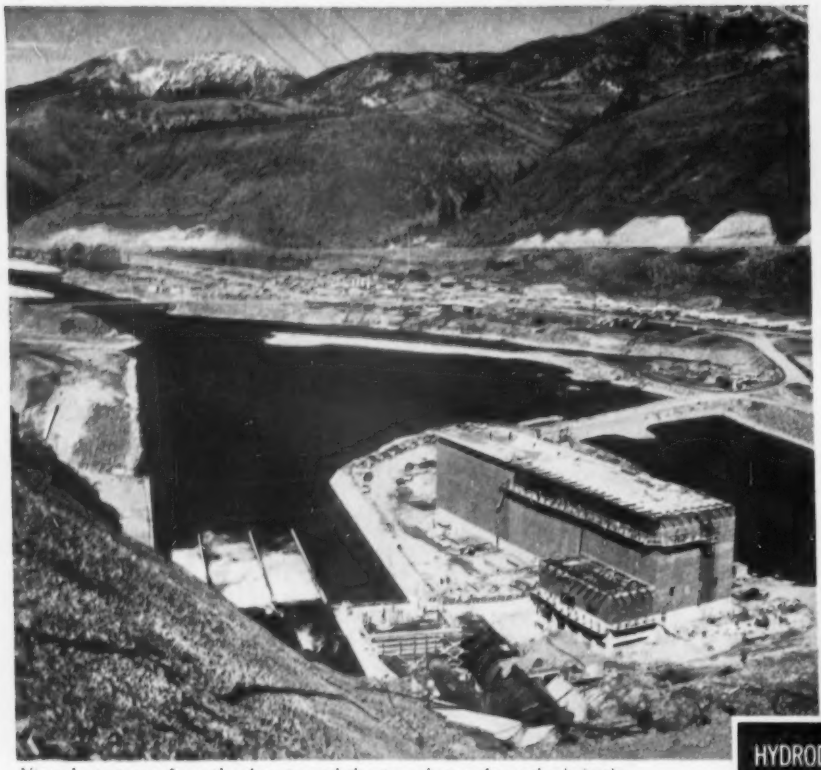
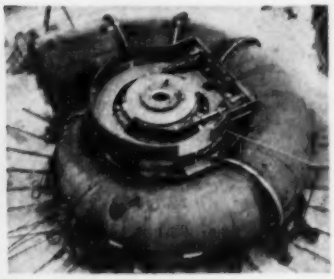
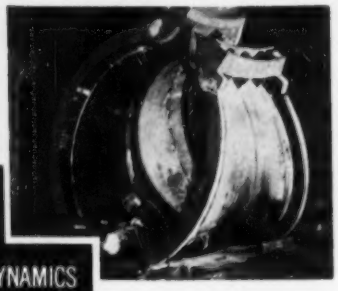


View downstream from the dam toward the powerhouse shows the irrigation bypass (left), penstock (center) and tail-race canal (right). *(U.S.B.R. photo)*



Final check assembly of Unit #2—a complete scroll case, pit liner, distributor gates and operating mechanism—is made in SMS shops prior to shipment to the site.

Welding a flange to a section of Unit #3's spiral steel case. SMS shops are completely equipped to fabricate weldments of the largest types.



HYDRODYNAMICS

MILE-HIGH SMS-FRANCIS TURBINES SOON TO DELIVER POWER AT PALISADES

High on the south fork of Idaho's Snake River, the first of four SMS-Francis turbines at Palisades Dam is scheduled to go on the line in 1956. The Palisades Dam, which is the Bureau of Reclamation's largest earth-filled dam, is primarily an irrigation project. The dam will have a crest length of 2,100 feet, rise 270 feet above the streambed, and provide a storage reservoir some 20 miles long and 3 miles wide.

Four vertical SMS-Francis turbines will be installed to produce a total capacity of 114,000 kw. Designed to operate at a site more than a mile above sea level, each unit is rated at 39,500 HP under a 190-foot head. The power generated will serve southeastern Idaho, where Atomic Energy Commission facilities and a growing phosphate industry now tax the existing electric supply.

Whatever your needs in hydraulic turbines and accessories may be, S. Morgan Smith offers 79 years' background in designing and manufacturing equipment for world-wide installation. This experience—over 16,000,000 HP installed capacity—is your greatest assurance of satisfactory equipment performance. For full information, write S. Morgan Smith Company, York, Penna., U.S.A.

HYDRAULIC TURBINES
PUMPS
GATES & HOISTS
TRASH RAKES
ACCESSORIES

HYDRODYNAMICS

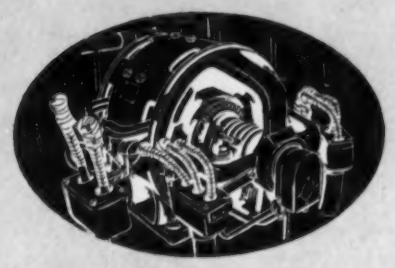
ROTOVALVES
BALL VALVES
BUTTERFLY VALVES
FREE-DISCHARGE VALVES
CONTROLLABLE-PITCH SHIP PROPELLERS

SMS

S. MORGAN SMITH

AFFILIATE: S. MORGAN SMITH, CANADA, LIMITED, TORONTO

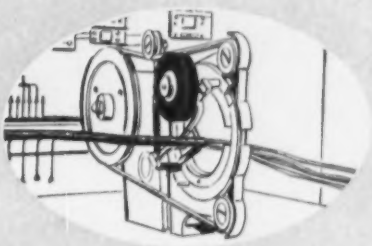
DUTCH BRAND
Plastic Electrical Tape



MAINTENANCE
Oil and dirt proof. Provides neat, positive insulation for all high voltage motor leads.

efficient, low cost insulation for the manufacture

PRODUCTION
Conforms to provide a safe, strong insulating seal in wiring harness.



and maintenance of electrical equipment

CONSTRUCTION
The perfect insulation for splices and terminals in junction boxes.

VERSATILE—Dutch Brand Plastic Electrical Tape offers maximum versatility and performance . . . especially where space is limited . . . it stretches 150% . . . conforms to irregular surfaces.

DURABLE—resists galvanic corrosives, rot, mildew, fungus, severest weather, and is not affected by water, oil, grease, acids or alkalies.

ECONOMICAL—the variety of sizes and widths available permit maximum tape economy for each job. Dutch Brand polyvinyl Plastic Electrical Tape .007″ thick for general use; .010″ thick tape for heavy duty protection and for use with power driven taping machines; and .020″ thick tape for extra heavy duty where abrasion and wear are met.

Call your Dutch Brand Man for a demonstration!

Tool Up with Dutch Brand Tape!

. . . and "Big Four in Electrical Tapes" tells you how. This new booklet is loaded with money-saving ideas. Write today!

JOHNS-MANVILLE DUTCH BRAND PRODUCTS OF QUALITY

Johns-Manville
DUTCH BRAND
PRODUCTS
7800 WOODLAWN AVENUE • CHICAGO 19 ILL

D. B. LAWTON, General Manager of General Electric's Medium Transformer Department, is shown with a model of the standard-design RM transformer. These transformers are manufactured in General Electric's $25,000,000 facilities in Rome, Georgia.

A GENERAL ELECTRIC 10-YEAR FORECAST:

$40,000,000 electric utility savings with medium transformer standardization

Based on today's eight percent lower price of standard ratings compared with specials, America's electric utilities stand to save—in the next 10 years—more than $40,000,000 on medium transformers (501 to 7500 kva, 69 kv and below). So forecasts D. B. Lawton, General Manager of General Electric's Medium Transformer Department, Rome, Georgia.

This $40,000,000 savings figure is conservative. Based on present standard-versus-special buying practice, it will be greatly exceeded if the utility industry continues to increase its acceptance of standards as in the past few years.

The tremendous saving due to lower prices is but one of the many benefits of medium transformer standardization. The modern, repetitive manufacturing facility put in place by General Electric at Rome in 1953 also makes possible:

Faster shipment—Ten-week shipment is now average for General Electric RM medium transformers. This compares with an industry average of more than 16 weeks for specials.

*Reg. Trade-mark of General Electric Company

More and better features—Standard design has made it economically possible for General Electric to offer such important extras as Formex* insulated windings, control-center arrangement of instruments and accessories, reversible junction boxes, full drain, and many others.

Higher quality for longer life—General Electric repetitive manufacture techniques permit 18 assembly-line tests and 22 quality control inspections during manufacture, to assure dependable operation over a long service life.

G.E.'S BROAD RANGE OF STANDARDS HANDLES 90% OF ALL JOBS

If your company is not yet taking full advantage of the large dollar savings and other key benefits of medium transformer standardization, act today. Ask your G-E Apparatus Sales Engineer to show you how G.E.'s broad range of standard RM medium transformers can meet the large bulk of your needs, work efficiently with older, special transformers now on your system. General Electric Company, Schenectady 5, New York. 416-7

Progress Is Our Most Important Product

GENERAL ELECTRIC

back of every RLM-Labeled Unit are 1,000 Words of Specifications

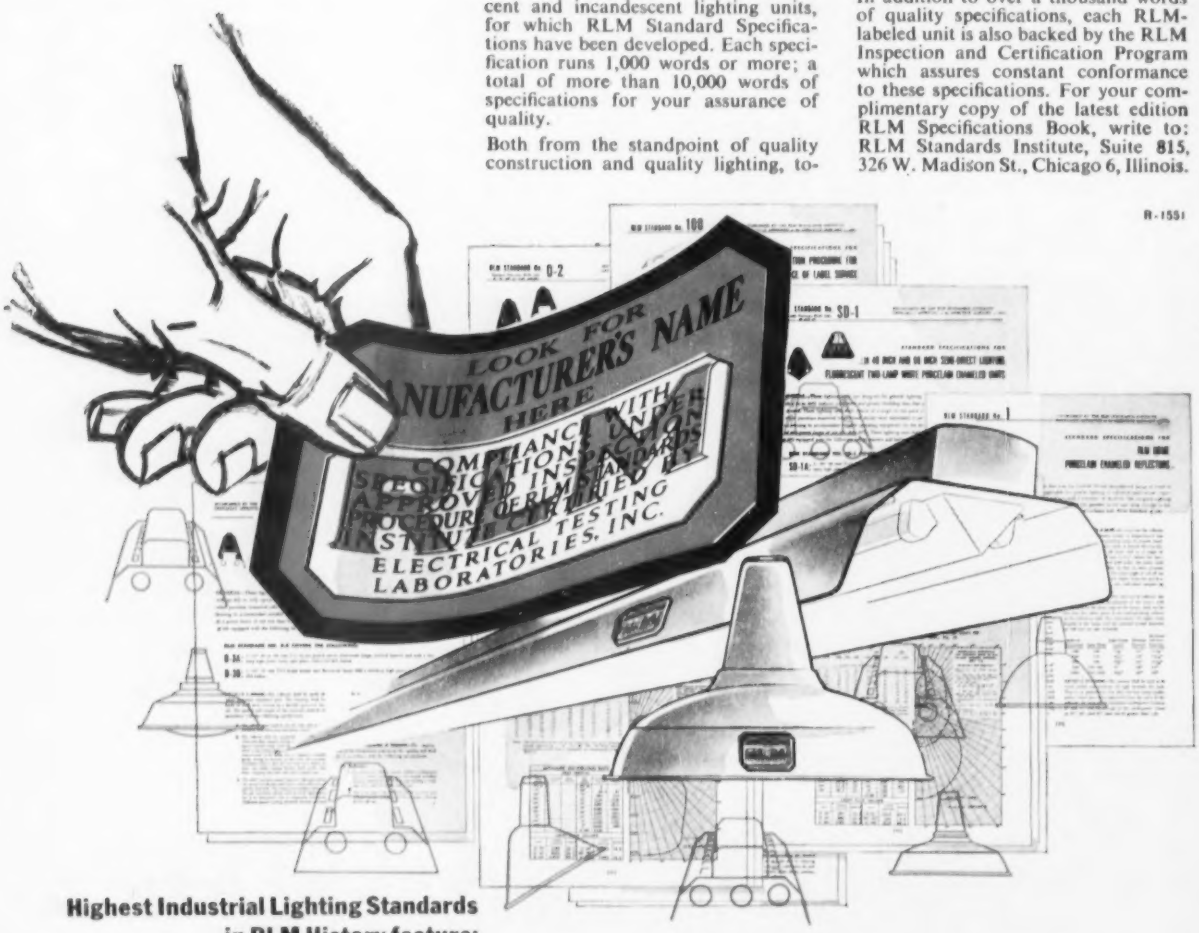
covering highest Industrial Lighting Standards in RLM History

Back of every RLM-labeled lighting unit is the assurance of over a thousand words of quality specifications. Each word is in accord with the basic, nationally-accepted minimum standards for industrial lighting equipment efficiency, design and performance. In all, there are 10 types of industrial fluorescent and incandescent lighting units, for which RLM Standard Specifications have been developed. Each specification runs 1,000 words or more; a total of more than 10,000 words of specifications for your assurance of quality.

Both from the standpoint of quality construction and quality lighting, today's RLM Specifications are the highest in history! The new RLM SD-1 standard for increased upward light, for example, calls for a fluorescent lighting unit with a 20% to 30% upward component to assure an important advancement in seeing comfort.

In addition to over a thousand words of quality specifications, each RLM-labeled unit is also backed by the RLM Inspection and Certification Program which assures constant conformance to these specifications. For your complimentary copy of the latest edition RLM Specifications Book, write to: RLM Standards Institute, Suite 815, 326 W. Madison St., Chicago 6, Illinois.

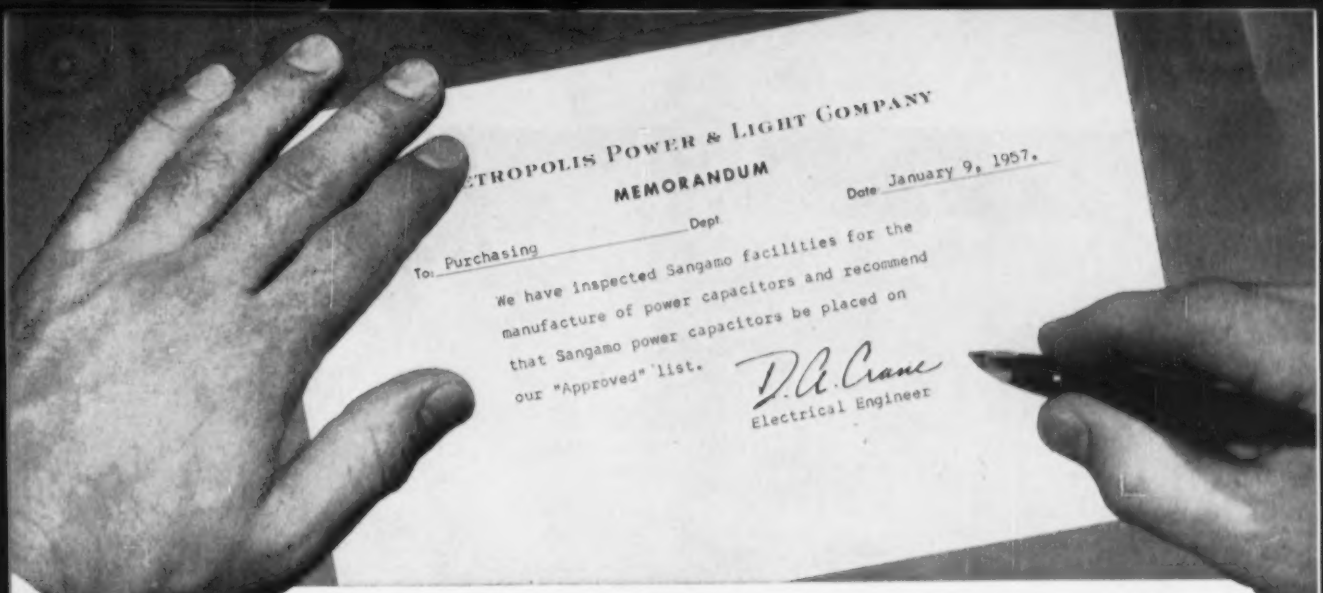
R-1551



Highest Industrial Lighting Standards in RLM History feature:

Higher light output • Lower-cost installation
Better protection against glare
More seeing comfort • Easier re-lamping
Increased brightness control
Reduction of light loss
Safety from electrical hazards
Protection against rust and corrosion

RLM STANDARDS INSTITUTE
INCORPORATED
The Trade Association for Reflector and Lighting Equipment Manufacturers


ETROPOLIS POWER & LIGHT COMPANY
MEMORANDUM
To: Purchasing Dept.
Date January 9, 1957.
We have inspected Sangamo facilities for the manufacture of power capacitors and recommend that Sangamo power capacitors be placed on our "Approved" list.
D.A. Crane
Electrical Engineer

SANGAMO CAPACITORS RATE "APPROVED LIST" of most major utilities

PCS7-1A

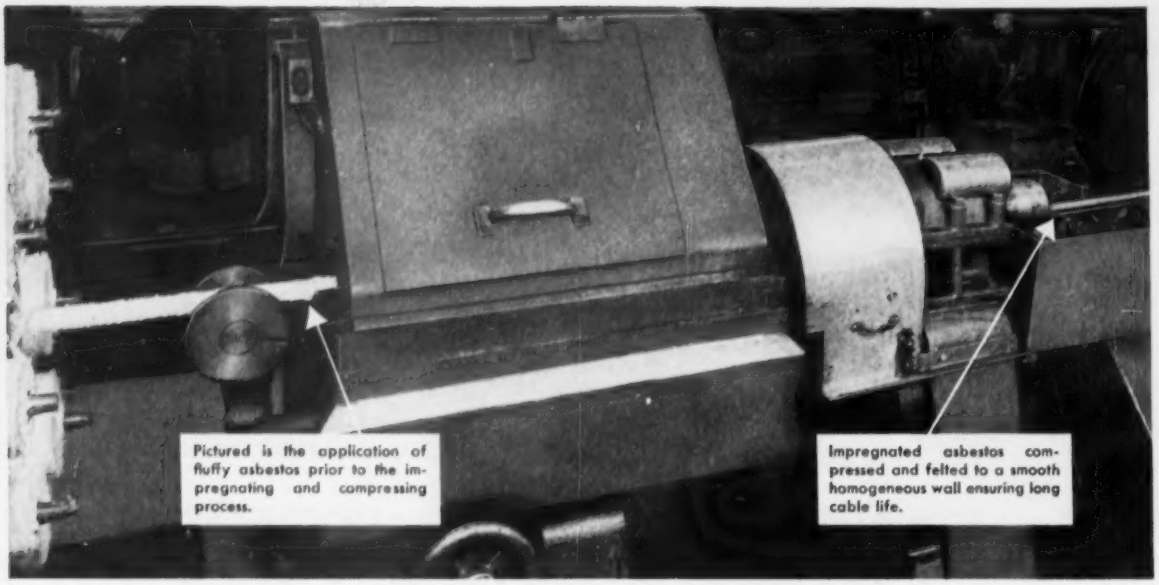
Engineers responsible for the purchase of power capacitors want to *know* how capacitors are made, what's inside them, and why they give assurance of meeting specific service requirements.

To provide this information first-hand, Sangamo, over the past two years, has had its power capacitor processing facilities inspected by engineering personnel of many major utilities. These engineers have placed Sangamo Power Capacitors on the "Approved List" of their respective companies.

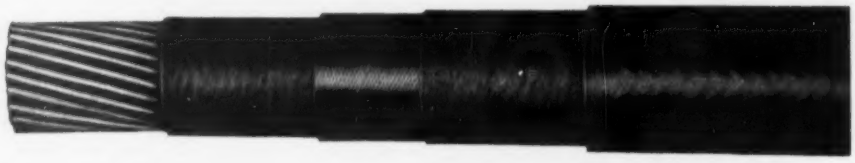
Sangamo invites you, also, to investigate its facilities, inspect its plants, and use its capacitors. Ask your Sangamo Representative, or write us for complete information.

SANGAMO ELECTRIC COMPANY, Springfield, Illinois

Group of engineers inspecting Sangamo manufacturing methods. Here they see how bushings are sealed to case by induction soldering.


Pictured is the application of fluffy asbestos prior to the impregnating and compressing process.
Impregnated asbestos compressed and felted to a smooth homogeneous wall ensuring long cable life.

Felted Asbestos Walls + Impregnation with Selected Compounds + Quality Varnished Cambric Tapes . . .



That's the Backbone of

ROCKBESTOS A.V.C.® (N.E.C. TYPE AVA) QUALITY

Different brands of N.E.C. Type AVA wire and cable may look alike on the surface but the sure proof of quality that means dependable service is beneath the braid.

In the Rockbestos A.V.C. construction dense, felted, thoroughly impregnated asbestos walls seal the varnished cambric tapes away from air and moisture.

The varnished cambric tapes are made to Rockbestos exacting specifications and are applied under controlled methods assuring uniform dielectric strength.

The result . . . you get long life and dependable service under every type of operating conditions . . . in temperatures up to 230°F.

Complete construction and test specifications of Rockbestos A.V.C. are in the new booklet: "Specifications RSS-88". Write for your copy.

STOCKED COAST TO COAST
Standard Rockbestos A.V.C. construction (N.E.C. types AVA, AVB, etc.) are available for immediate shipment. Call or write nearest branch office.

ROCKBESTOS PRODUCTS CORPORATION
NEW HAVEN 4, CONNECTICUT
NEW YORK • CLEVELAND • DETROIT • CHICAGO • PITTSBURGH • ST. LOUIS
LOS ANGELES • NEW ORLEANS • OAKLAND, CALIFORNIA • SEATTLE

L-M's New 32-Step Regulator Combines All Desirable Features In One Unit

Some regulators have certain desirable features; some have others. Line Material engineers found that utility men were looking for a single regulator that combined *all* the advantages of *all* the various makes into one compact, efficient unit.

That is why L-M has designed this new 32-step regulator. This new unit combines all the desirable features found in all the standard makes—plus a few L-M "exclusives." It is extremely reliable, and, above all, provides accurate regulation.

LINE MATERIAL

A McGRAW-EDISON COMPANY DIVISION

L-M Announces A Major Improvement In 32-Step Pole-Type Regulators

by **N. K. DELANEY**
Product Manager, Capacitors and Regulators

Some regulator designs provide one advantage, some another. In developing a new 32-step regulator, L-M engineers were trying to provide utility men with what they had asked for—one unit that would provide all the performance of any and all other pole-type regulators—and would include all the best operating and convenience features available. This is what L-M's new regulator offers you.

In addition, because of their experience in the design of Round-Wound* transformers, L-M engineers are able to offer certain other advantages that are exclusive in the new L-M regulator. We believe these advantages are real—that they will be reflected in savings in installation, operation, and depreciation.

Round-Wound Design Offers Balanced Performance

L-M's exclusive Round-Wound core-coil assembly provides a balance of low copper loss, low exciting current, and low core loss. The round coils and long creepage distance between windings and leads provide a high uniform impulse level and high short-circuit strength.

Smooth Tap Changes . . . Long Life

L-M's tap-changing mechanism is designed to give the longest possible contact life. The movable contacts and the arcing tips of the stationary contacts are made of arc-resistant copper tungsten material. And, in operation, a reactor bridges across adjacent taps to permit smooth tap changes without current interruption or voltage dip. In addition, the speed of the tap changer is hydraulically controlled to assure minimum arcing and maximum contact life.

Sensitive Voltage Control

The heart of L-M's regulator control is a dependable induction disc-type contact-making voltmeter. It is a sensitive but rugged and easily adjustable device which is very responsive to voltage changes. The band width can be adjusted from plus and minus ¾ to plus and minus 6 volts. The range of regulation can be reduced externally without de-energizing the regulator. And by doing so, it is possible to increase the operating current up to 160% of its normal rating.

Simplified Maintenance

The complete internal assembly is cover-suspended to simplify untanking for periodic inspection and maintenance. This outstanding feature permits you to inspect all mechanical and electrical parts quickly and easily without draining oil or dismantling the unit.

Less Bending Moment on Pole

L-M's new 32-step regulator has an exclusive obround tank design. The unit is smaller, lighter and has shorter moment arm distance from the pole. This substantially decreases the total bending moment on the pole.

Get More Information

Read the detailed information on the following pages and you will see why we say: "L-M's new 32-step regulator is here with everything." And ask the L-M Field Engineer for bulletins and information on features, weights and dimensions. Or write Line Material Company, Milwaukee 1, Wisconsin.

Available Ratings

2500 volts. . . . 100, 150 and 200 amperes
5000 volts. . . . 50, 100, 150, 200 amperes
7620 volts. . . . 25, 50, 75, 100, 150 amperes

Compare All Five!...

See Why L-M's New 32-Step Regulator Gives You All The Features You Want—In One Unit!

	Make				
General	**L-M**	**A**	**B**	**C**	**D**
1. 32 ⅝% steps	X	X	X		X
2. Plus and minus 10% range	X	X	X	X	X
3. ADD-Amp feature (under various names)	X	X	X		
4. Series arrester included	X	X	X		
Total Features	**4**	**4**	**4**	**1**	**2**
Transformer, Tanks, etc.					
1. Round-Wound transformer	X				
2. Obround tank	X				
3. Cover suspension	X		X		
4. Position indicator with drag hands and reset button	X	X	X	X	
5. Range-limit switches adjustable without de-energizing regulator	X	X			
Total Features	**5**	**2**	**2**	**1**	**0**

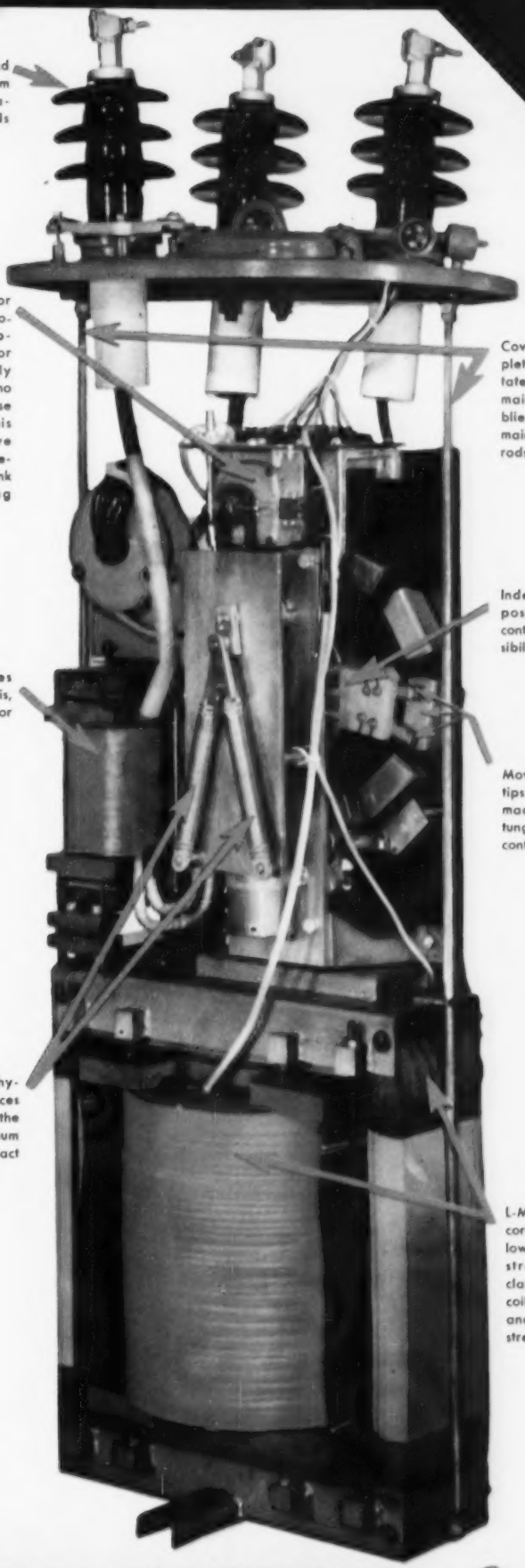
	Make				
Tap Changer	**L-M**	**A**	**B**	**C**	**D**
1. Single contact set	X	X	X		
2. Motor-spring drive	X	X	X		X
3. Index gear positioning	X	X	X	X	X
4. Controlled movable contact speed	X	X			
Total Features	**4**	**4**	**3**	**1**	**2**
Control					
1. Class 1 accuracy	X	X	X	X	
2. Induction disc-type voltmeter	X			X	
3. Integrating time delay	X	X	X		
4. Operation counter	X				X
5. Voltage level adjustment rheostat	X		X		X
6. Lightning arrester for control	X	X	X		
Total Features	**6**	**3**	**4**	**2**	**2**
SUMMARY OF FEATURES	19	13	13	5	6

Bushings are corona-free and are designed for minimum radio interference. Extra-long bushing shank extends well into the oil.

Capacitor-type drive motor loads the springs which provide the energy for tap-changing operations. Motor can be stalled indefinitely without injury. It requires no additional lubrication because it operates under oil. This simple and positive drive mechanism converts 360 degrees of rotation of the crank arm to one tap-changing operation.

Bridging reactor provides smooth tap changes—that is, without current interruption or voltage dip.

Drive springs house the hydraulic speed-control devices which govern the speed of the tap changer to assure minimum arcing and maximum contact life.



Cover suspension of the complete internal assembly facilitates periodic inspection and maintenance. All sub-assemblies are suspended from the main cover by steel support rods.

Index gear assures positive positioning of the movable contacts, eliminating the possibility of contact over-run.

Movable contacts and arcing tips of stationary contacts are made of arc-resistant copper-tungsten alloy to assure long contact life.

L-M's exclusive Round-Wound core-coil construction provides low losses. Round coils and strong steel frame, heavy clamping blocks and varnished coils prevent axial movement and assure high short-circuit strength.

LINE MATERIAL Regulators

A McGRAW-EDISON COMPANY DIVISION

Position Indicator Is Easy To Read

L-M's position indicator is oversize and is tilted so it's easy to read from the ground. The hands are brilliantly colored for better visibility. The drag hands (in red) indicate the buck and boost percent range to which the regulator has operated. They can be reset from the ground by simply pressing the reset button with a switch stick.

Plug-in Control Leads

All control leads terminate in a receptacle-type connector so the control can be easily removed if you want to mount it at the base of the pole. The controls are mounted in a weatherproof cabinet with stainless-steel hinges, so that they are very accessible.

L-M's New 32-Step Regulator Is Smaller, Lighter, Has Less Bending Moment On The Pole

L-M's exclusive obround tank design provides a smaller tank with less oil, resulting in a lighter, easier-to-handle regulator. The obround design also brings the center of gravity closer to the pole. This reduces the moment arm distance from the pole. This combination of lighter weight and less moment arm distance substantially decreases the total bending moment on the pole.

A comparison with three other manufacturers shows that the desirable low-bending moment of L-M's new regulator is exceeded by as much as 136%.

Compare Percent Bending Moment for 100 AMP regulators:

	Manufacturer			
Voltage Class	L-M	A	B	C
2500	100	167	236	184
5000	100	141	171	142
7620	100	137	173	153

Also, L-M's new 32-step regulator is shorter, and requires less pole space. L-M's new regulator is as much as 21 inches shorter than other regulators.

Faster Cooling

Cooling tubes on L-M's new 32-step regulator provide adequate cooling to maintain low hot-spot and top-oil temperatures. Transfer of heat from the copper to outside air is faster and more efficient because of reduced mass. Only L-M's new 32-step regulator has the obround tank design with these outstanding advantages: less height, less weight, and less bending moment on the pole.

Greater Current Capacity With ADD-AMP Feature

Regulating Range	Current Capacity
% "Raise" or "Lower"	Percentages of Rated Amperes
10	100
8¾	110
7½	120
6¼	135
5	160

As the table illustrates, reducing the range of regulation through five steps makes it possible to increase the load-carrying capacity of the regulator up to 160% of its normal rating.

LM®

LINE MATERIAL

A McGRAW-EDISON COMPANY DIVISION

Regulators

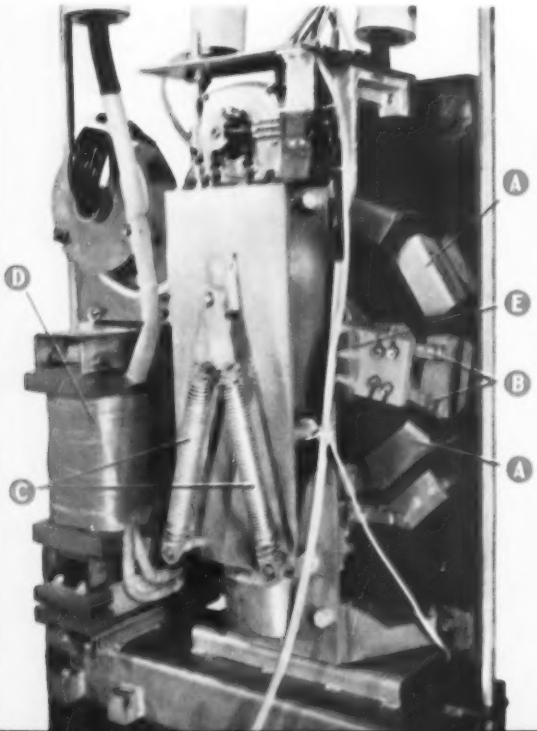
L-M's New 32-Step Regulator Provides Sensitive Control With Integrated Time Delay

An induction disc-type contact-making voltmeter is used in L-M's voltage control to provide greater sensitivity. It also assures ease of adjusting the voltage level and band width. The band width on L-M's voltage control can be adjusted from plus and minus ¼ volt to plus and minus 6 volts.

The integrating time delay device will produce a tap change when the average time of voltage outside the band width exceeds that inside the band width. The integrating time delay can be adjusted independently on both "raise" and "lower" through a range of from 10 to 120 seconds.

All Components Are Readily Accessible For Setting Controls and Checking Operation

1. Induction disc-type contact-making voltmeter
2. Control power switch
3. Test terminals
4. Integrating time delay
5. Operation counter
6. Line drop compensator resistance setting
7. Line drop compensator reactance setting
8. Voltage level adjustment
9. Selector switch
10. Meter shelf



Smooth Tap Changes And Arc-Resistant Material Assure Maximum Contact Life

The movable contacts and the arcing tips of the stationary contacts are made of arc-resistant copper-tungsten alloy. In operation, the motor loads drive springs which provide the energy for the tap-changing operations. Hydraulic devices within the springs control speed of the tap changer. They provide optimum speed in making and breaking contacts, assure minimum arcing and maximum contact life.

In addition, a reactor bridged across the movable contacts provides smooth tap changes without current interruption or voltage dip. An index gear assures positive positioning of the movable contacts. There is no possibility of contact over-run.

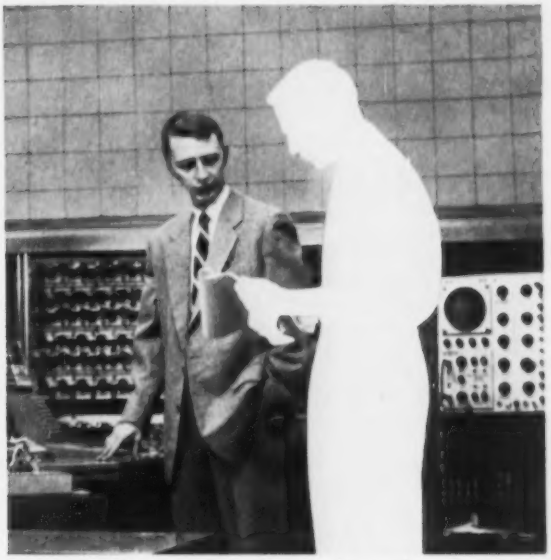
A. Stationary contacts
B. Movable contacts
C. Drive springs
D. Reactor
E. Index gear

LINE MATERIAL
A McGRAW-EDISON COMPANY DIVISION

Regulators

IBM GROWTH promoted these men

PRODUCT DEVELOPMENT ENGINEER: Before his recent promotion, this man was a member of a small engineering "team" (two M.E.'s, an E.E. and a model maker) in IBM Product Development. His specific project entailed the creation of the "ultimate package in printed circuitry." His group "brainstormed" the project in continual sessions, putting the results in model form. Then the group would try to "tear the idea to shreds" in order to create something even better.



PRODUCT CONTROL ENGINEER: Promoted recently, this man formerly worked in IBM Manufacturing Engineering. His job was to design information systems to insure a smooth flow of work through the plant. "It takes *creative* engineering ability to design these systems," he'll tell you, "and it takes *administrative* ability to 'sell' a system to higher management and make it stick. If you possess that rare combination of creative and administrative capability, this is the job for you!"

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Jobs like these continually open up at IBM—due to rapid expansion. If you are an engineer or scientist—or have equivalent experience—you may be qualified for such a position. Innumerable opportunities exist in:

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- Electrostatic phenomena
- Real time systems engineering
- Photo and magnetic device memory
- Semi-conductor research, development, and manufacturing
- Manufacturing process control
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Economic experts rank the electronic computer with automation and nucleonics in growth potential. More than 10,000 electronic computers will be in operation by 1966. IBM sales have doubled, on the average, every five years since 1930. IBM engineering laboratory personnel quintupled in the past five years. IBM spent $19,000,000 on research and new product development in 1956. Salaries are excellent; company-paid benefits set standards for industry today. Personnel turnover at IBM is less than one-sixth the national average.

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ELECTRA'S HUSBAND

"Should It Be Given Another Look?"

ELECTRA showed more than passing interest the other evening as I spread the contents of my brief case in neat piles over the dining room table.

"What's this?" She picked up a stapled sheaf of legal-sized papers.

"I'm on the legislative committee of the association, and am studying the bills introduced in the legislature."

"SB 423," she read, then looked up quickly. "That's not nice giving something a bad name serial number."

I choked as I was lighting my pipe. "That means 'Senate Bill No. 423.' There were 422 ahead of it in this session."

She picked up another. "HB 267—"

I cut in before she strained too hard. "That means 'House Bill.'"

I proceeded to explain the enacting clause, description and short title; the reasons for bracketed and underlined words when amending a section; and pointed out a technical flaw in the bill.

Electra paid close attention. Her eyes followed my finger across the typed lines, occasionally glancing at me like she does when she realizes that I know something besides ranges and deepfreezes.

"One of the ladies was telling us, today at Lit," she mused, "that women should study politics. Perhaps if I read this, I'll be able to take part in the discussion. What's this statement —bill—all about? The short title calls it 'The Electrical Inspection Act of 1957.'"

"The electrical inspectors drafted that bill to require at least code-standard electrical installations. Look it over while I study these recommendations for dryer circuit sizes."

The TV set wasn't used that evening, although several of Electra's favorite programs were being aired. As I worked, I could hear pages turn. Once, I glanced into the living room and saw that she had the dictionary open and some of my handbooks had quietly moved to the end table.

At the usual time, she carefully moved a couple of my piles to a chair and set the cups on the table. Contrary to her custom of briefing me on the neighborhood news during the coffee break, Electra stayed in a silence so deep that I shuddered when I looked over the brink. I decided that I should prepare myself for when she came up for air.

After giving the coffeemaker a quick rinse, she resumed her education in the living room. At a late bedtime, Electra asked permission to lay HB 267 on the dining table and adjourn to the back room.

As I put on my pajamas in the dark, thinking best not to waken her, the silence broke with an atomic blast.

"That inspector's act," Electra declared, "is the beginning of the straitest strait jacket ever to be laced up!"

I encouraged her by not answering.

"If that passes," she said, "you won't be able to replace those worn baseboard sockets like you do on holidays. I won't be able to get the washing machine going by giving the motor a kick while yanking on the cord. That reminds me, you've been promising to find what's wrong with the washer, but I still use bobby pins over where the cord is frayed."

"A licensed electrician needn't be called on minor repairs," I said to get her back on the subject. "It says so in the bill."

"I saw that," she retorted. "But who is to decide what is minor? Oh, I'm not complaining of your friends in the inspection office. They are all good boys, trying to be sensible. But every so often they get one who likes to operate by laws he passed himself."

I counted to ten. "The bill merely provides a set of minimum construction standards and for selection of workmen through licensing," I said as gently as I have been known to get.

"The bill is innocuous (I looked up that word after I got home from Lit) enough," Electra said, "but it's a foundation for little by little additions to the point where the state will declare that a licensed electrician must be called to change a lamp bulb—"

"Replacement of lamps is specifically exempted," I injected.

"—in an urban area. That's another thing! Your bill is dis-dis-discriminatory. It's selective in both locality and use of electricity. It's—it's—well, it's just a fence that some group put around its own yard, just to have governmental blessing for gouging the unprotected. It exempts all people, except the poor householder or small business man, and firms who do electrical work with their own crews on their own premises. If I'm going to get inspected on that washing machine, I want the farmers and the power company—and the mines and the railroads—to be inspected too!"

I tried a little logic. "You've struck a point, there. The bill is to recognize a trade segment and to police its work—all in the public interest. Many householders need protection from unscrupulous or unskilled contractors—and from themselves. The policeman on the corner, whistling at jaywalkers, isn't there to keep people conscious of government. He is to keep those foot travelers from being smeared all over the pavement, and to hold down taxpayer investment in ambulances and drivers. . . . The person who knows the least of a hazard is most apt to get his short-range and long-range economics mixed up. We must keep him harnessed—to save money in fire-fighting equipment."

"Oh, turn out the light," Electra snapped. "Why, it isn't on," she chuckled.

But I didn't sleep for quite a while, thinking that Electra's point of view may well be that of a lot of the public. Maybe it should be thought over from that standpoint more to improve it. For many a set of good intentions are forged into what turns out to be bad law.

Here's **MORE** Progress in Switchgear from Allis-Chalmers

NOW Power-Operated Hydraulic Tank Lifter

Available for Allis-Chalmers intermediate breakers. Another example of Allis-Chalmers progress in simplifying maintenance while increasing safety. Costs no more than hand windlass type, yet cuts raising and lowering time by 80%.

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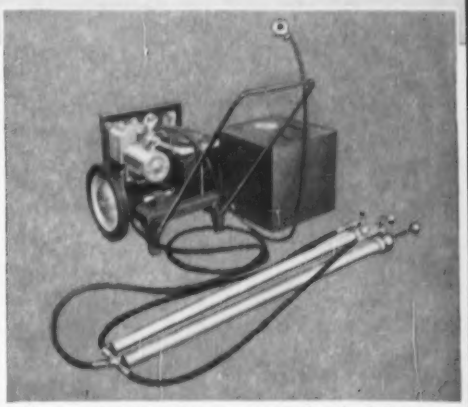
This is only one of many features of Allis-Chalmers all-new intermediate outdoor oil circuit breakers. Find out more by calling your nearby A-C office, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.



No *Pneu-Draulic* operator on your breaker? Battery operated hydraulic tank lifter is available. Same cylinder and flexible hose. Same operating characteristics.

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LETTERS TO THE EDITOR

Supports Previous Data

To the Editor:

I have just finished taking another look at the November 1956 issue of ELECTRICAL WEST in order to make sure that I read correctly the editorial appearing on p 110 of that issue. This editorial deals with the recent AIEE paper based on studies sponsored by the American Iron & Steel Institute in order to determine a number of basic factors dealing with the current-carrying capacity of insulated wires and cables installed in raceways. One of the most important parts of this study dealt with the correction factors necessary when installing more than nine wires in a raceway, particularly when the effect of diversity is taken into consideration.

Knowing of my interest in the general subject of current-carrying capacity, you can well appreciate that I followed this entire project from its very inception and was very happy to note that the actual correction factors determined from this investigation, including diversity, coincided almost 100% with theoretical figures advanced by the writer prior to the start of the work. I was, however, particularly pleased to note the editorial treatment accorded the results of this investigation, particularly the contents of the last two paragraphs. It is my sincere hope that the findings, a summary of which was presented in the AIEE paper, will subsequently find their way into the National Electrical Code which currently has no provisions regarding the reduction factors to be used when more than nine conductors have been installed in a raceway. It is also my hope that consulting engineers and architects will begin using these reduction factors even before they have been made part of the National Electrical Code.

S. J. ROSCH
Consulting Cable Engineer
Anaconda Wire & Cable Co.

Helpful to Many

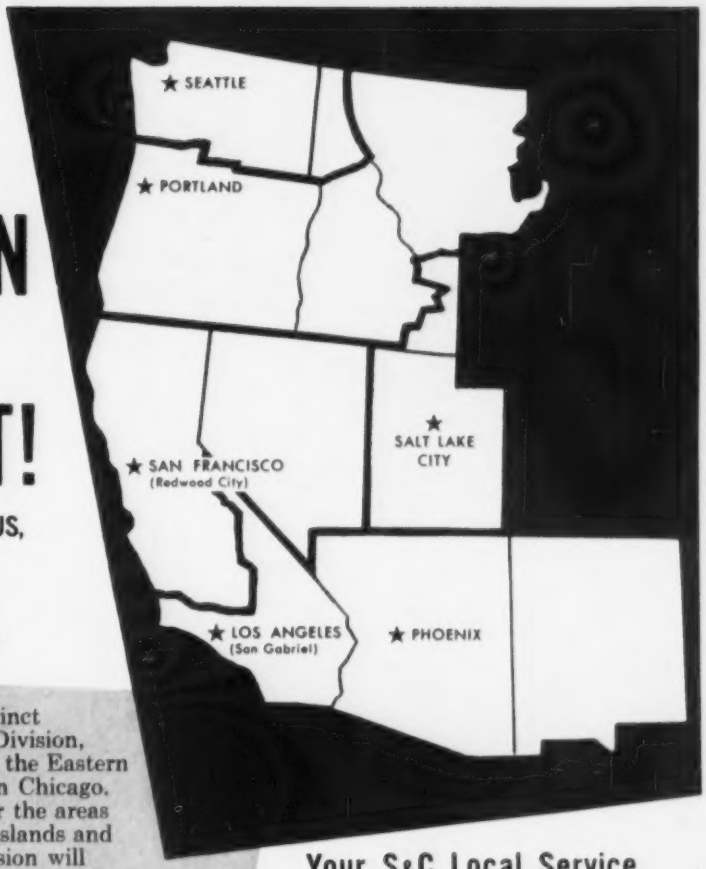
To the Editor:

We would appreciate receiving, if possible, two copies of either reprints or tear sheets of the series of articles on "Grounding—Center of Confusion" by Tom Hughes, which appeared in several issues during 1956. These articles contain very valuable information and would be very helpful to us.

H. BOEHMER
Chief Engineer
Utah Power & Light Co
Salt Lake City

The WESTERN STATES and HAWAII represent 20% of your total market for electrical equipment and supplies — For thorough advertising penetration of this rich market there is no better medium than ELECTRICAL WEST, 68 Post St., San Francisco 4, Calif.

S&C Electric opens a SALES DIVISION *for the* DYNAMIC WEST!



HUTCHINSON HEADS AUTONOMOUS, COMPLETELY SELF-SUFFICIENT SALES UNIT — A NEW IDEA IN ELECTRICAL APPARATUS SALES!

S&C Electric has established two distinct sales operations—the Western Sales Division, headquartered in Redwood City, and the Eastern & Central Division, headquartered in Chicago. The western unit will handle sales for the areas shown above; also for the Hawaiian Islands and Alaska. The Eastern & Central Division will handle all others.

Each of these divisions has been set up to execute the full sales program of the company, including customer order acceptance, field service, custom engineering, and warehousing.

The new Western Sales Division will be headed by Robert W. Hutchinson, and will be fully operational on April 1st with warehouse stocks, complete engineering staff, and order service personnel.

Local service for the Northern California and Nevada territory will be provided by S&C sales engineers operating out of a sales office also located at Redwood City. Local service for other territories will be handled by sales representatives in the principal cities, shown above, as in the past.

R. W. Hutchinson

R. W. Hutchinson, new Western Sales Manager, has been associated with switchgear manufacturers in the West for many years. He received his engineering degree from the University of Washington in 1932.

Your S&C Local Service for the West

Southern California, Arizona, New Mexico—
H. J. Randolph Company
736 Santa Anita St. (P. O. Box 38)
San Gabriel, California
H. J. Randolph Company
1029 N. First St.
Phoenix, Arizona

Northern California and Nevada—
S&C Sales Engineering
2525 El Camino Real
Redwood City, California

Oregon, Central and Western Idaho—
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Portland 7, Oregon

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POWER FUSES • DISTRIBUTION CUTOUTS AND FUSE LINKS • LOAD INTERRUPTERS • METALCLAD SWITCHGEAR

DESIGN OF WORLD'S LARGEST STEAM TURBINE is discussed by General Electric Vice President G. B. Warren (center), and Large Steam Turbine-Generator Dept. engineers R. Shepperd (left), and C. W. Elston. Cross-section drawing of 450,000-kw unit is shown in background.

What is the turbine of tomorrow?

Advantages of cross-compound units herald new design trend . . . Case in point: 450,000-kw six-flow unit

It is apparent that rapid growth of the utility industry will continue to create a demand for millions of kilowatts of steam turbine-generators. More frequent demands for larger blocks of power have led to the development of larger turbine-generators. This fact is spurring the trend toward cross-compound units because of the inherent advantages of this design for very large ratings. An interesting example is General Electric's new 450,000-kw cross-compound turbine-generator.

WORLD'S LARGEST

This is the largest unit now being built in the world. Operating at initial steam conditions of 3500 psi and 1050 F, its thermal cycle efficiency will be substantially better than any other unit now in commercial operation. The new giant power maker will be a double reheat, 3600/3600 rpm cross-compound, six-flow turbine-generator with 50/50 load split. This design allows duplication of generators, exciters, transformers and electrical buswork, which leads to savings in initial engineering and construction of the plant. Duplication of foundation structure is possible for a very large part of both primary and secondary shafts. Placement of the high-pressure section on one shaft and the first reheat section on the other shaft provides additional space for routing of the high-temperature piping under the foundation.

FUTURE APPLICATIONS

Looking beyond this advancement, General Electric engineers are applying the knowledge and experience gained from the design and construction of this unique turbine to even more efficient machines in the not too distant future. Such engineering know-how will help offset the trend of rising construction and operating costs, because these large, efficient units reduce plant volume per kw of capacity. For information about General Electric Steam Turbine-Generators, contact your General Electric Apparatus Sales Office. General Electric Company, Section 301-319, Schenectady 5, N. Y.

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MORE POWER TO AMERICA

GENERAL ELECTRIC

ELECTRICAL WEST SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U. S. VOL. 118, NO. 3 MARCH 1957

Customer complaint survey pinpoints effectiveness of methods of responding to "trouble calls" and insures procedures that will . . .

Keep the Customer Happy

"It doesn't have to make sense, it's company policy!"

While the above quip is intended to be a ludicrous description of some companies *modus operandi*, its existence in fact bears witness to the need for, and growing popularity of, the specialized customer relations staff in the up-to-date business today.

The real danger inherent in the company-policy line of thinking lies in its application in dealings with customers. As work loads increase and the pressure of deadlines make themselves felt, human nature compels the public contact employee to seek a quick and easy "out" in the handling of a grouchy or complaining customer. When this behavior pattern becomes a generalized thing, it can threaten the very existence of the organization imbued with it.

Getting along with the customer is a fundamental precept for the continued and successful operation of any business. To take a good example, the Southern California Edison Co. has long been aware of the value of good customer relations. Over the years, the maintenance of public good will has been a primary job of district and local managers throughout the Edison system. These men have been significantly successful in helping to sustain in the public mind a picture of Edison's high principles of public service and its keen interest in being a useful member of each community it serves.

This personalized customer relations plan has worked and is working remarkably well. It has its limitations, however; particularly in view of the tremendous post-World War II population influx into Edison's service area. When communities were close-knit and the population relatively stable, it was possible to convince its family of customers that the Edison motto, "Good Service, Square Dealing, Courteous Treatment," was a factual description of Edison's way of doing business and not just a fanciful slogan.

The mass migration of people to the Golden West, however, has had its varied effects from the tremendously increased demand for Edison's electric service to the impact on the company's customer relations. A tribute to the flexible and progressive character of Edison thinking can be found in the manner in which these challenges were and are being met.

To fill the need for electricity, vital to growth and progress, this investor-owned public utility undertook a tremendous construction program, unequaled by any organization in its field. That Southern California Edison continues to grow and prosper is in no small measure a result of the successful manner in which this program has proceeded.

Adjustment of long-standing relations practices has also been made a priority task at Edison. Management took the necessary steps to enlarge its customer relations staff, simultaneously charging it with "the responsibility for the programming and follow-up of the company's customer relations activities."

The primary task of the customer relations staff became: (1) the development of a program embodying the measurement of customer attitude; (2) an evaluation of the effectiveness of Edison's institutional advertising; (3) the training of employees in customer relations responsibility; (4) *and the determination of the extent of customer satisfaction with Edison services and policies.*

Membership on the combined customer relations committee of the American Gas Assn. and Edison Electric Institute proved invaluable. Through this committee, it was possible to secure outlines of similar programs undertaken by sister utilities, such as the Pennsylvania Power and Light Co., Pacific Gas and Electric Co. and others. This data provided the nucleus from which was devised a multiphased, working program geared to the particular needs of Edison and the area that it serves.

Space does not permit a lengthy discussion of each of the many activities that have been developed and are in progress. Briefly, the program includes:

1. A customer attitude survey of 3,000 customers, selected at random on a proportionate basis in each district throughout the system, to determine general public opinion of the company, its services, policies, and direct mail leaflets

2. A review of customer service requests, 4,000 system-wide, from the standpoint of courtesy, promptness and efficiency

3. An up-to-date compilation of all available data regarding the many communities served by Edison to be used by district and local management as an aid in continuing the personalized approach of customer relations

4. A new employee indoctrination and continued employee training program, based on the AGA-EEI course which involves a series of five film-strip and record sessions, augmented by detailed booklets, in the principles of customer relations

5. A system-wide survey of customer complaints and compliments on a twice-yearly basis, rotated by commercial division described here.

It is the stated belief of Edison

management that every customer complaint provides the company with a rare opportunity to win a friend. Employees are impressed with the thought that the complaint situation may be the *only* occasions of contact between that particular customer and the company and, therefore, every effort should be expended to assure the customer's complete satisfaction.

To further this aim, and in keeping with its charged responsibility to follow-up all phases of customer relations activity, the staff organized a plan of activity known as the Customer Comment Record Study.

For several months, a series of pilot studies were conducted with the cooperation of public contact employees in a number of representative districts, to determine the relative incidence and type of customer complaints registered throughout the system.

With this accumulated information, it became possible to outline the procedures to be followed and the form to be used in the final study method. The form, known as the Customer Comment Record Card, is illustrated.

On the front, the employee handling the complaint lists the complete circumstances of the problem, including the district, date, customer's comments, customer's name, address, phone and account numbers, employee's name and action taken to satisfy the complaint. In the space marked "code," the employee indicates by a number and letter the general complaint category which covers the particular situation. This code is explained on the reverse of the card (also pictured).

From the preliminary studies it was possible to classify all customer complaints into three main categories, which are identified by numbers; e.g., group 1—Complaints About Money, group 2—Complaints About Services or Functions and 3—Complaints About Personnel.

Specific categories are listed as subheadings by letters; e.g., under the main heading "About Money" are grouped complaints about: (a) high bills; (b) rates; (c) credit; (d) notices; etc. Similarly, under the heading of complaints "About Services or Functions" are listed: (a) service off; (b) circuit outage; (c) street lights; (d) service wires; (e) poles and facilities; (f) meters; (g) voltage; etc.

Using this system, statistical compilation is simplified since it is possible to refer to the upper right-hand corner of the card and tell the general complaint category at a glance. For example, a card coded "1B" lists a complaint against rates, a card coded "2G" reflects a voltage complaint, etc.

The card itself having been devised, the next step was to organize a realistic schedule of surveying the 31 separate districts within the five Edison divisions. The problem was to develop a continuing program without subjecting the staff to a complete flood of complaint cards from all districts at once.

The final plan called for a one-month study in each district, twice yearly, to be conducted on a division basis. Thus, for example, the eight districts in Edison's eastern division have been studied simultaneously throughout the calendar month of January 1956 and again throughout the month of June 1956. The remaining four divisions were scheduled for February and July, March and August, April and September, and May and October, respectively. The months of November and December are to be reserved for compilation and analysis of all information obtained by the study.

This plan has worked exceedingly well. It permits two complete system-wide studies annually. It avoids peak work loads on staff personnel and it provides for a review of both odd and even months in each district to provide a representative sampling in view of Edison's bimonthly billing system.

A brief description of a typical district study situation should provide essential details of how the system works.

Approximately two weeks prior to the start of the scheduled month, a supply of customer comment record cards and a procedural outline are mailed by the customer relations staff to the district office. This provides district supervisory personnel with sufficient time in which to train employees in the procedures of the study.

Starting the first working day of

Customer comment record card provides a quick way of analyzing customer complaints and providing for follow-up to insure full customer satisfaction

Southern California Edison Company

Check one, please . . . Compliment ☐ Complaint ☐

District_____

Code:_____ Date_____

Customer's Comments_____

Customer's Name_____ Phone_____

Address_____ Folio_____

Your Name_____

Action Taken:_____

CUSTOMER COMMENT RECORD CARD

Your cooperation in recording customers' comments briefly, whenever you receive a compliment or complaint about the company, will play an important part in helping to provide continually improved service to our customers.

Please write in the "Code" on reverse side of card using the classifications below, fill in other spaces as indicated and forward to office manager.

1. ABOUT MONEY

A. High Bills
B. Rates
C. Credit
D. Notices
E. Deposits
F. Claims
G. Other Charges
H. Miscellaneous (Specify)

2. ABOUT SERVICES OR FUNCTIONS

A. Service Off
B. Circuit Outage
C. Street Lights
D. Service Wires
E. Poles and Facilities
F. Meters
G. Voltage
H. Radio & TV
I. Appliance Service
J. Tree Trimming
K. Delay in Service
L. Residential Sales Services
M. C & I Sales Services
N. Miscellaneous

3. ABOUT PERSONNEL

A. Who work in the commercial office.
B. Who work out of the commercial office.
C. Who work out of the superintendent's office.
D. Others (Please specify)

SOUTHERN CALIFORNIA EDISON COMPANY
EDISON BUILDING • P.O. BOX 351
LOS ANGELES 53, CALIFORNIA

Mrs. John Doe
601 W. 5th St.
Los Angeles, California

Dear Mrs. Doe:

On August 1, 1956, you contacted our General Office regarding your electric service. It is our understanding this matter was handled to your satisfaction.

We, of the Southern California Edison Company, are proud of our policy of "Good Service, Square Dealing, and Courteous Treatment". It is our constant desire to make this policy a working part of our daily contacts with our customers.

To accomplish this aim, we ask your cooperation in filling out the questionnaire on the reverse side. Will you please answer all questions as completely as possible. Space is provided for any remarks or suggestions you care to make.

Your opinions are important to us. For your convenience, we have enclosed a stamped, self-addressed envelope.

Thank you for your cooperation.

Southern California Edison Company
Customer Relations Department

A CUSTOMER IS THE MOST IMPORTANT PERSON IN OUR BUSINESS

CUSTOMER QUESTIONNAIRE

1. How did you contact our Company?
   By phone_____ By mail_____ In person_____
2. Was the person taking your request courteous? Yes_____ No_____
   Remarks_____
3. Was your request handled promptly? Yes_____ No_____
4. If not, how much delay was involved? Hours_____ Days_____
5. Was the field representative or other person who completed the service call courteous and pleasant? Yes_____ No_____
   Remarks_____
6. Was your request completed to your satisfaction? Yes_____ No_____
   Remarks_____
7. Do you have any suggestions for improving our services?

A CUSTOMER IS A PERSON WHO BRINGS US HIS WANTS - - -
IT'S OUR JOB TO FILL THOSE WANTS.

The customer "follow-up" letter is a means of determining if the complaint, corrected satisfactorily as far as the company was concerned, was corrected to the satisfaction of the customer. Data from reverse side give clues for improvement

the month, every customer complaint and compliment received in the district is recorded on a card. This includes personal contacts in the office and in the field, telephone contacts and contacts by correspondence. At the end of each work week, the cards are reviewed by the district or office manager and forwarded to the customer relations staff office.

At the end of the month, after all cards have been completed by the district and percentages reviewed by interviews and questionnaires, a detailed report is prepared for presentation to the commercial vice-president. Copies are forwarded to the appropriate division and district managers and a file copy retained for eventual inclusion in a combined division-wide report. A chart is prepared for presentation with the division report which provides a statistical comparison between districts and between the various complaint categories.

From the information thus obtained, a clear picture is developed of the relative areas of weakness in particular districts and divisions from the customer relations standpoint. It then becomes possible to recommend remedial action where necessary.

To date, Edison has completed its first, system-wide study and is well into the second. Although suffering from the usual minor discrepancies, which arise in a completely new activity of this sort, the over-all results of the first complaint survey have firmly established its merit and make it appear that its continuation as a permanent customer relations activity is justified.

Examples of the worth-while information disclosed can be obtained from the following statistics:

During the five one-month study periods, a total of 1,622 complaints were recorded in the 31 districts.

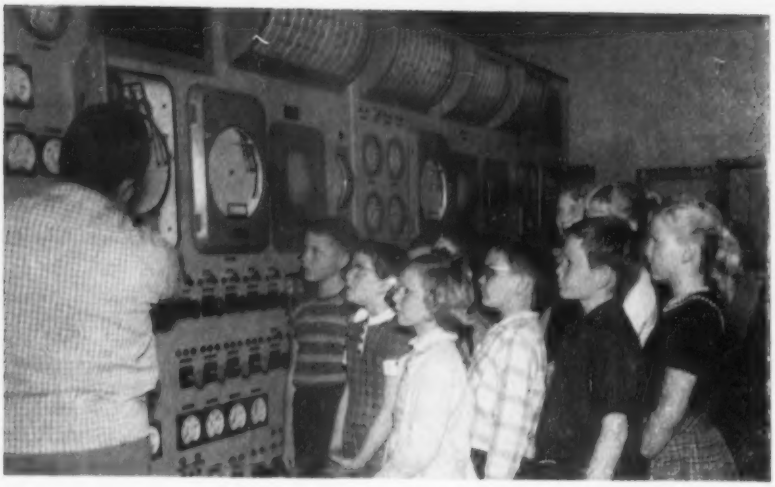
Misunderstandings leading to high bill complaints totaled 646 and represented 39.8% of the whole, nearly six times as great in number as the next largest group. Of this number, the percentage applicable to rates was negligible.

The next five categories in order of frequency were: delay in service, 109 or 6.7%; notices, 93 or 5.7%; street lights, 92 or 5.6%; service off, 88 or 5.4%; and voltage, 82 or 5.1%. As a group, these six categories represented nearly 70% of all complaints received.

Although the final report of the first study's combined results has only recently been submitted to management, certain changes have taken place and are under consideration which justify, in themselves, the positive gains to be realized through studies of this nature.

Since about four out of every ten complaints received were concerned with high bills, it logically followed that an appraisal was in order to determine just what procedures were being followed in investigating such complaints. A survey of district methods revealed considerable differences in approach and a wide variation in the investigative processes in use.

Recommendations for correction of these variations are currently being studied for the dual purpose



Future customers are not excluded in the public relations activities of Southern California Edison Co. These children are honor students at Central School and are members of the Explorers' Club. They are shown here as they examine the control panel of Edison's Redondo Beach station which serves their community. Paul Trigg is the operator explaining the panel. Students were Electrical Week guests

of realizing a consistent application of a single standard of procedure which will prove most effective in handling high bill complaints to him of the investigation results.

This new standard places additional emphasis upon the importance of customer satisfaction by establishing an accountability for prompt and fully detailed reports to the customer of the investigation results.

It further provides a system for determination of the customer's reaction to the report when personal contact is otherwise impossible. But, most important of all, it outlines in detail the step-by-step procedures to be followed by both office and field personnel in the handling of routine high bill complaints.

As might be expected, such changes beget other changes, including the need for a revision in the customer request or complaint form currently in use. In its analysis of the study results, the customer relations staff recognized a number of basic weaknesses in this form, including its limited applicability, discrepancies in its use and the lack of an adequate system of control.

Recommendations for correction were forwarded to the commercial vice-president who, in turn, enlisted the experience of the staff responsible for such revisions in preparing a more adequate form. The opinions of personnel in the field were solicited which, when combined with the basic recommendations, resulted in a compromise document superior to the original and completely satisfactory to the requirements of the new standards of procedure.

Also subjected to close scrutiny as a result of the study findings was the existent system of coordinating requests for service with disconnection orders at the same address. Since the majority of the "Service Off" complaints were a result of disconnection errors, staff recommendations were based on the adoption of a standardized method by all districts; a method designed to provide coordination where it was lacking.

Other procedural changes and proposed revisions resulting from the study included a supplement to the group street light replacement program, the purpose of which was aimed at the problem of a more prompt detection of outages. The remaining changes were mostly restricted in scope to a particular division, district or area as the study results indicated the existence of purely local problems.

In the final consideration, it is generally agreed within the company that the customer comment record study has proved to be a valuable and constructive activity that will contribute in large measure to the maintenance and improvement of the company's high customer relations standards.

Another phase of customer relations activity, touched only in passing in the beginning of this article, is the excellent employee training program now being conducted at Edison. This program involves the continual circulation, throughout every work location, of a series of five film-strip and record sessions, each dealing with a different aspect of employee-customer relations.

This program was secured from the combined customer relations committee of the American Gas Assn. and Edison Electric Institute and includes, as supplements to the films, descriptive booklets and a reference book known as the *Manual of Customer Relations.*

The manual actually serves as a guidebook for supervisory or other personnel in the conduct of the film-strip training meetings. It also serves as a source of information and provides answers to general questions.

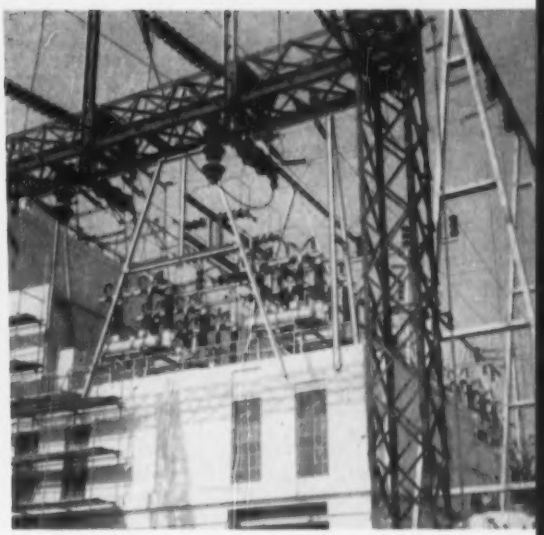
These manuals are readily available in each district office but the film-strip programs are in constant rotation among the districts within a particular division. Each quarter the programs are rotated between divisions, providing each work location with a different employee training subject every three months. Reaction to the program has been excellent and it is planned to repeat its circulation when the present schedule is completed this month.

No discussion of a customer relations program would be complete without some evidence of the public reaction to it. It is in this regard that the company's customer relations staff takes the most pride.

Repeatedly, interviewers make reference in their field reports to the expressions of pleasant surprise and extreme satisfaction indicated by customers, unaccustomed to the added touch of good service which this program promotes. In their replies to mail questionnaires as well, an extremely high percentage of customers include complimentary remarks concerning the purposes of Edison's customer relations activities. Typical of such comments were those of a Covina resident who stated: "I have always found, or it has always been my opinion, that the Edison company is a square dealing outfit. The interest in wanting to make sure the bill is correct and your effort to see that I have been satisfied proves that my opinion of your company was correct."

Incentive-building remarks such as these are of extreme value in Edison's employee training program. As they are received, in interviews and by mail, they are copied verbatim and placed in a special file for eventual inclusion in an employee commendation booklet. This booklet will be generally circulated among all Edison employees to serve as tangible evidence of the positive results to be gained through a realistic, working customer relations program.

This Station . . .



Expanded . . .

Over Two Times on the Same Lot

E. W. Werk
Electrical Engineer, Station Design Section
Los Angeles Department of Water & Power

Receiving station A, the first receiving station constructed for the city of Los Angeles power system, was completed in 1917. Originally, the station consisted of a four-story concrete building (see cut above), an outdoor 138-kv double-ring bus connecting the two belt lines to receiving station G and to receiving station F. The building accommodated all the control facilities of the receiving station and provided three floors of 34.5-kv positions for feeders to various distributing stations, and lines to load and distribution transformer banks.

On the third floor rear was located a 115-kv section of the station that consisted of eight positions of double bus, double breaker design to accommodate two lines from the Aqueduct power plants and four lines to 115/34.5-kv load banks. This building also accommodated distributing station No. 1, which consisted of two 34.5/4.8-kv distribution banks and regulated 4.8-kv feeders to serve the immediate area. The 115- and 138-kv portions of the station were tied together by a 60,000-kva, 115-138-kv transformer bank in each of the two buses.

As the city grew the department's program of system expansion necessitated the removal of the 115-kv Aqueduct power plant lines from this station. With the removal of this source of power, the two 60,000-kva 115/138-kv bus banks were limiting the expansion of this station to 120,000 kva and with one bank out of service the overload capacity of the remaining bank was considerably less than this amount. This, together with the desire to comply with the basic power system plan, dictated that this station be converted to 138 kv to utilize the full output of the four belt lines now terminating at this station.

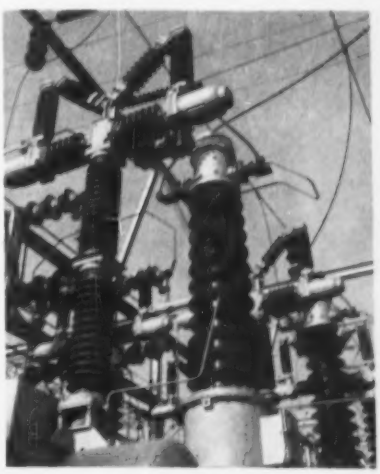
The Design Problem

Studies indicated a need for 300,000 kva or 2½ times increase. There was no additional real estate in the area. *Would it be possible to increase station capacity 2½ times using only the space occupied by the eight 115-kv positions?*

We decided that the new 138-kv load bus section of the 138-kv rack would have to be installed in the building in the space occupied by the old 115-kv equipment. It was also determined that three 100,000-kva, three-phase, 138/34.5-kv transformer banks would be required to provide the ultimate load requirements for this station. On this basis, a 138-kv rack to accommodate the three new transformer banks and two positions for transmission lines from power sources would be required.

Building Too Small

Layouts were made of the space available and where there was space



Brown Boveri air-blast circuit breakers were the key to station A expansion

LA's Basic Power System Plan

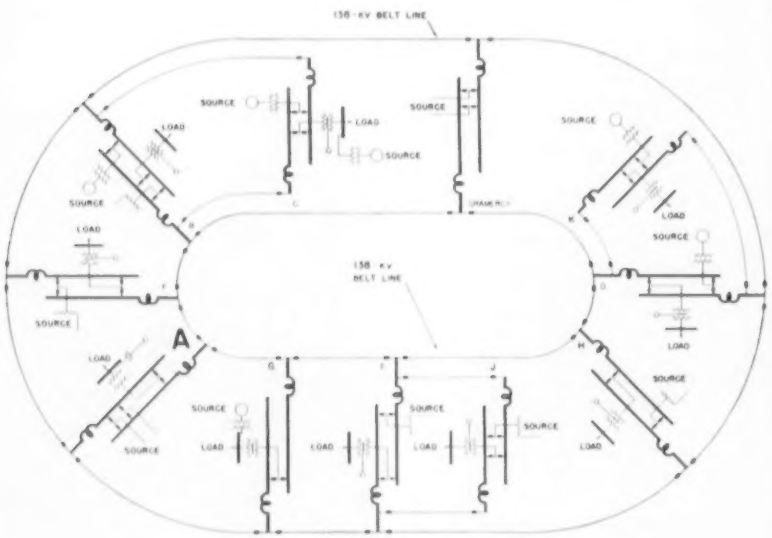
The electrical engineers of the Department of Water & Power of the city of Los Angeles in 1923-24 developed a fundamental plan for serving electrical energy to the city. This plan, called the basic power system plan, was the result of a careful analysis of the anticipated load growth of the Los Angeles metropolitan area and consideration of the many problems involved in serving a rapidly growing community.

	1923	1957	% Increase
Population	850,000	2,250,000	265
Winter peak (kw)	145,000	1,300,000	900

While it is probable that the system planners of 1923-24 had not visualized such a rapid and abnormal growth of the city, nevertheless their planning reflected the wisdom and farsightedness in recognizing that Los Angeles would become a highly industrialized and manufacturing city. The department's power system then, as now, continues to meet the needs of the city in supplying on time the power necessary to keep ahead of the rapidly increasing demand for electricity in Los Angeles.

The department's program of system expansion calls for modification of existing stations, belt lines and transmission lines to best utilize existing plant and to obtain conformance with the basic power system plan. This basic plan provides for the 138-kv belt-line connections between existing and new receiving stations and anticipates that each receiving station will ultimately have a direct source of generation to its load bus. Every receiving station with its power source and its 34.5-kv distributing system is to be considered an isolated power system and each isolated power system is to be connected to a common bus or belt circuits through suitable reactors. During periods of growth the belt-line interconnections permit a receiving station to be established in advance of the power source for the station, the belt lines acting as a supply during the initial years.

The basic plan was adopted in 1926 when only three receiving stations existed and when city-owned generating capacity totaled less than 120,000 kw. It is the plan toward which all construction since 1926 has been aimed and, with the exception of certain modifications, the original plan has been very closely followed. A diagram showing how receiving station A fits into the 138-kv belt line system is included.



DOUBLE BUS, SINGLE BREAKER BELT LINE OPERATION

for eight 115-kv positions in the building there now was space only for four 138-kv positions. Column spacings and ceiling heights would not be adequate for 138-kv clearances. As five load bus positions were required, it meant that an addition to the building would have to be provided to accommodate the fifth position.

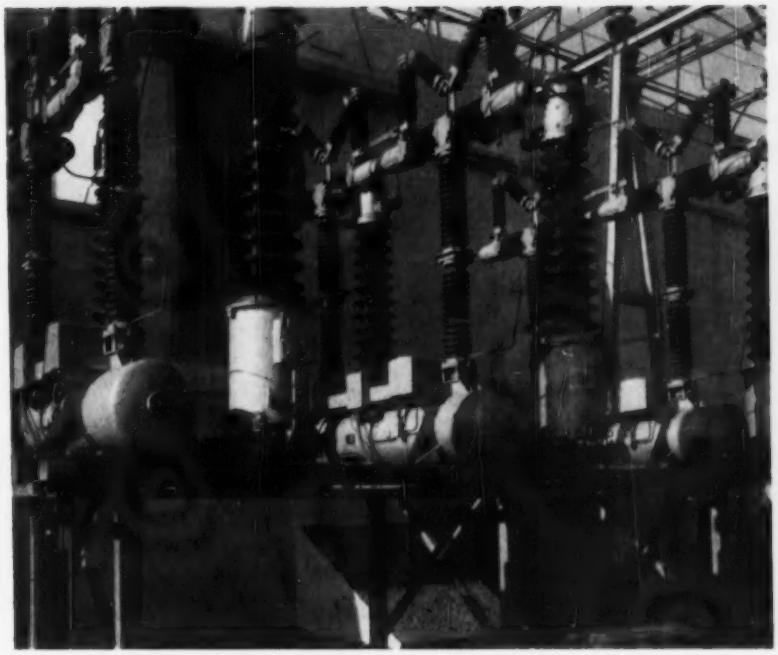
Consideration was given to removing the roof and walls of the 115-kv section of the building creating, in effect, an outdoor rack at the third floor level. Doing this would accommodate the five 138-kv positions that were required. It was decided, therefore, that a 138-kv rack would be installed on the third floor level of the same general type and design used in our outdoor receiving stations. The rack was to be constructed of standard structural steel shapes and of the conventional double breaker, double bus design. The buses were to be strain type, consisting of bare stranded copper cable supported at each end by strain insulators. The 138-kv lines to the transformer banks were also to be bare stranded copper cable supported by strain insulators.

Air Breaker Selected

Since the building was constructed in 1917, an engineering check was made to determine if the third floor would withstand the loading of an outdoor 138-kv oil circuit breaker of 5,000,000-kva interrupting capacity. Both dead weight and impact operation were studied. It was determined that to accommodate an oil circuit breaker of this size the floor would have to be heavily reinforced at considerable expense. Because of this requirement, it was decided to purchase air circuit breakers because of the light weight and negligible impact characteristics. Brown Boveri 138-kv, 5,000,000-kva air circuit breakers served by a central air supply were installed. Installation of this type of breaker made it unnecessary to reinforce the third floor level in any way, and they have proved very satisfactory in their performance.

Transformers Outside

The 100,000-kva, three-phase 138/34.5-kv FOA transformers were purchased from the Pennsylvania Transformer Co. and located outside the building at ground level. While converting the station to 138 kv, it was necessary to keep the station in full operation to meet the consumers demands. The three 100,000-kva transformers were ordered



Air-blast circuit breaker positions such as this were selected because they could be placed on the cutout section of the station roof without costly reinforcing

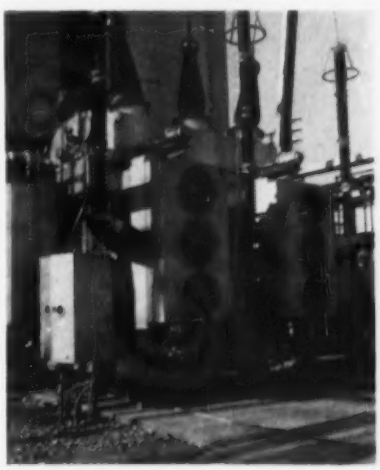
far enough in advance of actual construction to permit their use in temporary locations. It was determined that at least two of the 100,000-kva banks must be in operation at all times to meet the station's load requirements. The third bank was required in case any one bank failed or was out of service for maintenance. The three transformers were placed in temporary locations and connected to the 34.5-kv buses in such a way as not to interfere with station construction. Moving the 100,000-kva transformers from the temporary to the permanent positions was accomplished by moving and putting into complete operation one bank at a time, thus keeping in service the two banks required.

A Bus for Each Floor

The 34.5-kv buses from the transformer banks to the 34.5-kv bus sections are 2-in., extra-heavy IPS copper. The buses leave the transformers through wall bushings into the building and are supported on bus insulators to their respective 34.5-kv positions. As the 34.5-kv section of this station occupies a portion of the second, third and fourth floors, a bus from one transformer bank terminates at each of these floors. Thus, a 100,000-kva transformer bank supplies one floor or bus section. The 34.5-kv sections are also of a double breaker, double bus design and the buses are tied together from floor to floor by means of bus tie cables with reactors to limit the interrupting duty on the 34.5-kv oil circuit breaker when all three transformer banks are in service.

Works Fine

This installation has proved satisfactory in every way. The station has conformed to the basic power system plan and has proved the ability of the station to supply the consumers in this area the power required for many years to come.



Each transformer serves a bus on one floor—and the buses can be tied

Hanging By a Thread

It must have been fun for the BuRec engineer that closed the 13.8-kv bus tie breaker. For across the two buses he was linking a generation pool of about 60,000,000 kva in the East with the 6-8,000,000-kva generation pool in the Pacific Northwest. The field test took place in the bureau's switchyard at Fort Peck, Mont. During the few minutes that the tie held, about 26,000 kva passed from the eastern to the western power pool.

How Come?

Aside from the natural, bizarre interest in this sort of tie, the bureau had a real purpose in undertaking the test. There was a power shortage in the bureau's Dakota system during several winter months, while at the same time power was being sold at "dump rates" in the West. Studies by bureau engineers on a network analyzer, making simplifying assumptions, indicated that the interconnection might be within the limits set by the tie breaker and the adjacent lines. They decided to try. A cold snap in the Northwest created a challenging background for the test. When the tie was made, it only held for six minutes. The tie was re-established but strong load swings on the Western system indicated that the experiment should stop.

During tests, sync swings passed through 890 miles of the USBR system in Montana, North and South Dakotas, and were too fast to be affected materially by automatic generation changes in the USBR system.

When East and West systems were tied in at Ft. Peck, the excellently regulated eastern frequency was imposed on BPA's system—virtually eliminating the action of its frequency-sensitive generation control devices.

Meaning?

Few people question that in a few years the whole U. S. will be tied firmly together—all utilities operating in synchronism. There will be many operating economies with this type of operation.

Probably this is a case where coming events cast their shadow before them.

Photo from Ghost Towns of Colorado, Hastings House.

Leadville 1880 . . . Searching for riches

The Doin's at Leadville is our way of directing our readers' attention to a series of "doin's" that won't be done for several years. In addition, we would like to point out that the doin's are being done by a group of companies. Also, we hope we can whet your appetite for when the doin's are done we want to tell you what they did.

Participating Companies
Public Service Co. of Colorado (Sponsor)
Aluminum Co. of America
American Bridge Division of U. S. Steel Corp.
Hughes Brothers Inc.
Malleable Iron Fittings Co.
Ohio Brass Co.
Westinghouse Electric Corp.

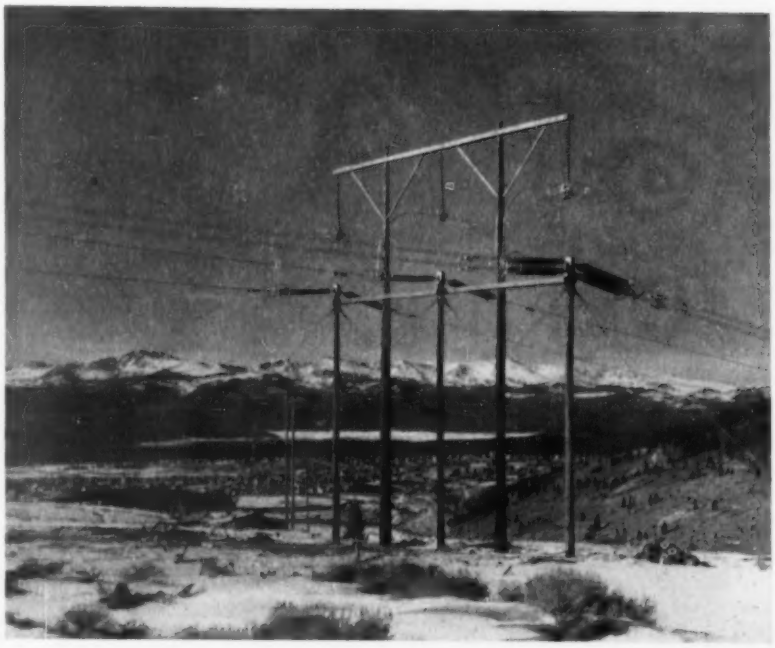
The Doin's at Leadville

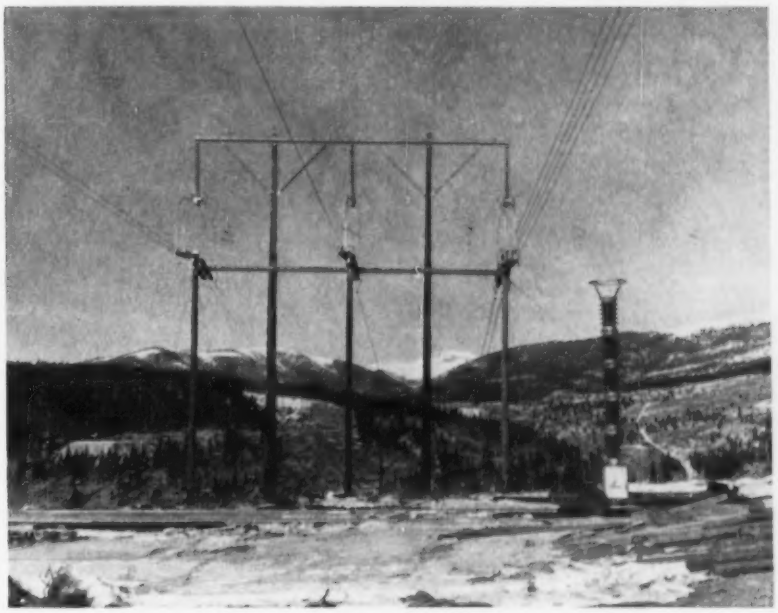
Gold was discovered in 1859. Leadville exploded into the largest city in the Colorado territory. Even after the gold played out, the town grew because somebody found that the rocks that had plagued the gold miners were a rich lead–silver ore. By 1890, the area's population was more than 35,000 people. The town supported an opera house, 120 saloons, 110 beer gardens, 118 gambling halls and 35 bagnios under the direction of a Sally Purple. This was the year that the Tabor opera house was lighted with electricity—from a 2-kw generator. Just like New York!

On the Western slope of the Rockies are coal fields. Coal means power. Mine mouth plants might answer the area's power requirements. To move these blocks of power, transmission lines would have to be built at extra-high voltages and in the Colorado Rockies this means problems. For five months of the year snow stands high on a tall Indian and the wind through the Iowa Gulch would stand a city man in terror.

Colorado Public Service engineers studied the problem and concluded

Leadville 1957 . . . looking for answers





Dead-end structure No. 3, which has choke coil mounted to prevent coupled noise from getting on test lines. The 330-kv coupling capacitor will be used to measure the generated RI on lines

that a test line should be built that would yield data and experience, which would enable their company to build reliable transmission lines at voltages up to 500 kv. This far-reaching study program has now come to pass as the result of close cooperation between the Colorado Public Service Co. and several leading manufacturers.

High Altitude, High Voltage Problems

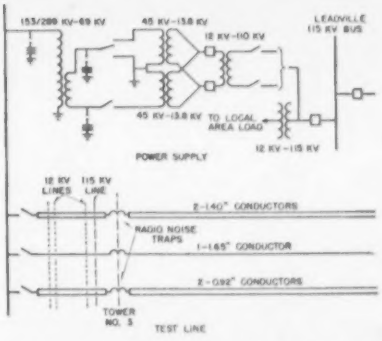
The interest in higher voltages, aside from loss and power transfer advantages, stems from the near impossibility of handling massive conductors in the precipitous mountain region. Higher voltage would ease the construction problem only to impose a corona loss and radio interference problem because of the high altitude. An apparent means of reducing radio interference and corona would be to use bundled conductors but, here again, experience with spacer designs and actual conductor performance at these elevations and weather conditions is a matter of conjecture.

Much has been learned in the area of extra-high voltage transmission as the result of the TIDD studies and some foreign work but, to date, there is no reliable way to equate results to those which would be encountered above 10,000 ft in the Colorado Rockies. All available high-altitude data were too narrow in scope to base recommendations for an actual line.

Here then are the questions that had to be answered before a soundly engineered extra-high voltage line could be constructed.

1. Of the many possible combinations of towers, which one would lend itself best to construction in the Rockies? Also, which one would best survive the wind, lightning and snow slides and still be economical?

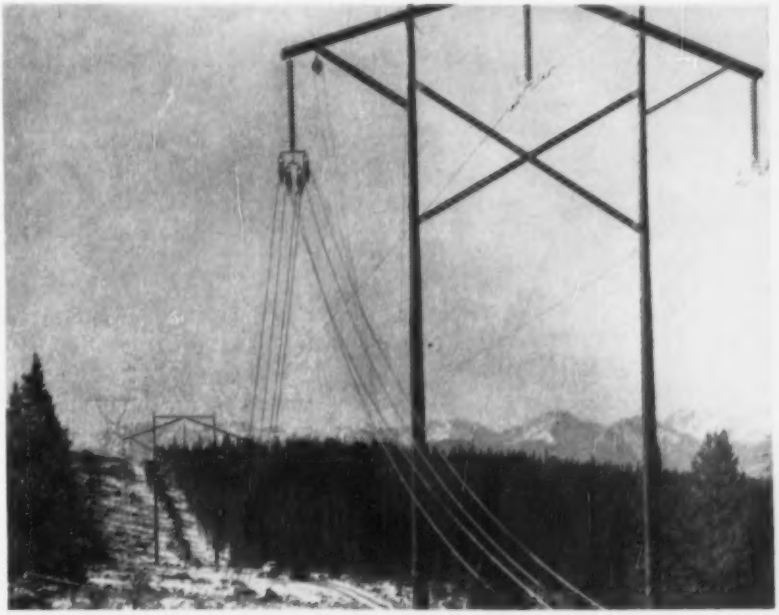
2. In view of the yet unknown effects of corona and radio noise at this altitude, which voltage, which wire size and configuration should be used in this area? Would bundled conductors prove in?



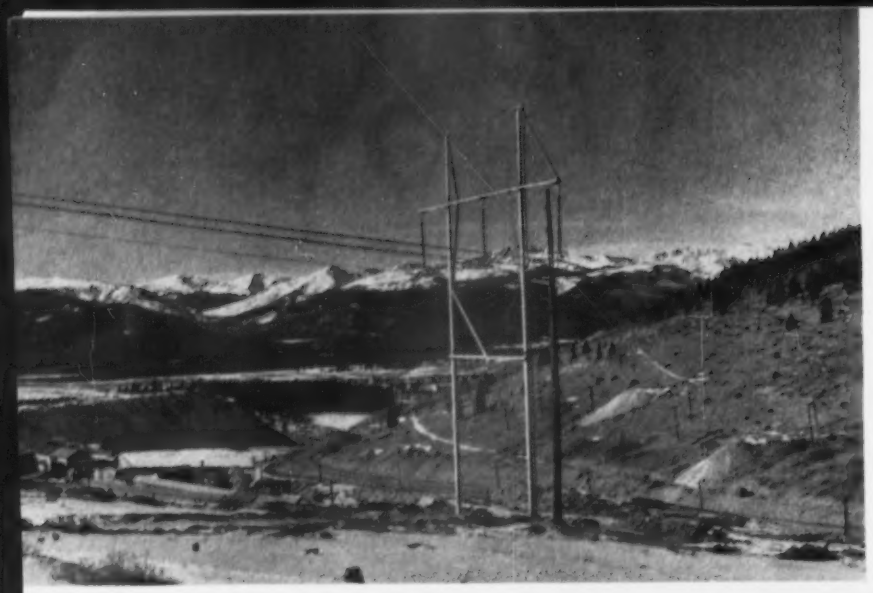
Schematic of the test line and single-phase power supply for the test line

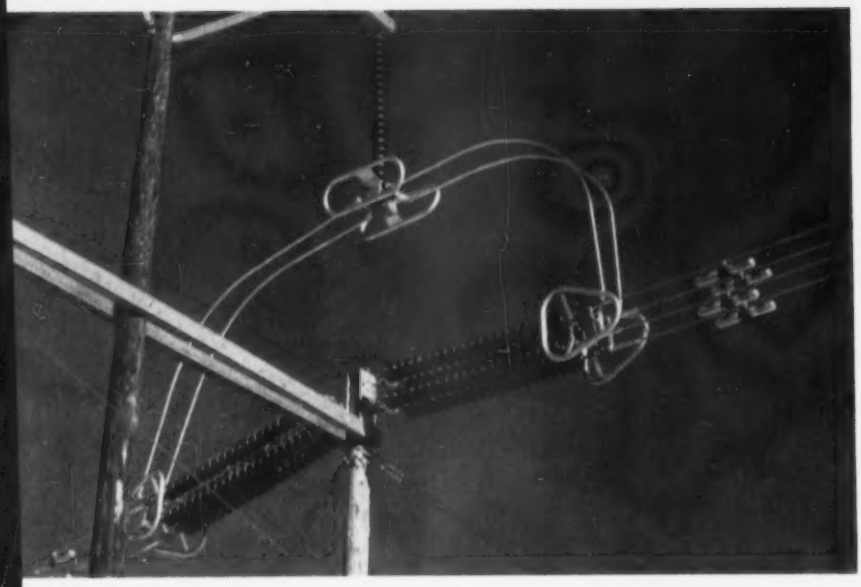
The Test Setup

The test setup is shown as a one-line diagram. Notice that the test is made on a single-phase basis, thereby enabling three types of lines to be tested, two bundle conductors and a single conductor. Information gained during the TIDD experiments indicates that conversion into three-phase results can be accomplished. The conductors have been selected to be similar to those studied on the TIDD line so that direct comparison of results can be made to data gathered under the new conditions. Attention is called to the use of radio noise traps at



Towers 7, 8, 9 show the diversity of line and tower construction. The four-conductor line will be used for calibration, then will revert to two





the third tower, which will eliminate the possibility of station equipment noise or any noise coupling between the test line and nearby 12- or 115-kv lines. Measurements will be taken beyond the third tower.

Insulators and Hardware

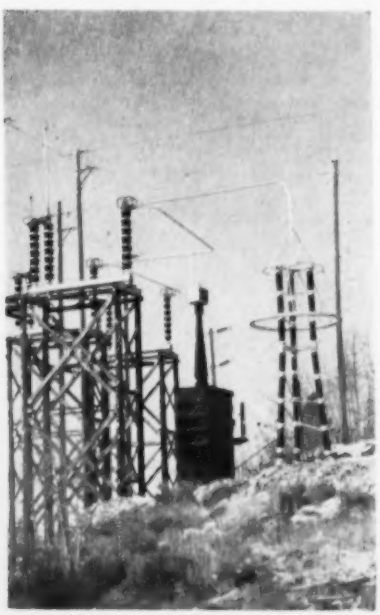
Test and experience with hardware and insulators proved that they would be trouble-free to 500 or 600 kv, well above the test level. This was advantageous since the test measurements were to be directed toward the conductor. Poor performance of the insulators might render the results inconclusive. Special control rings for the insulators were designed and tested to give an even greater spread between insulator and conductor characteristics.

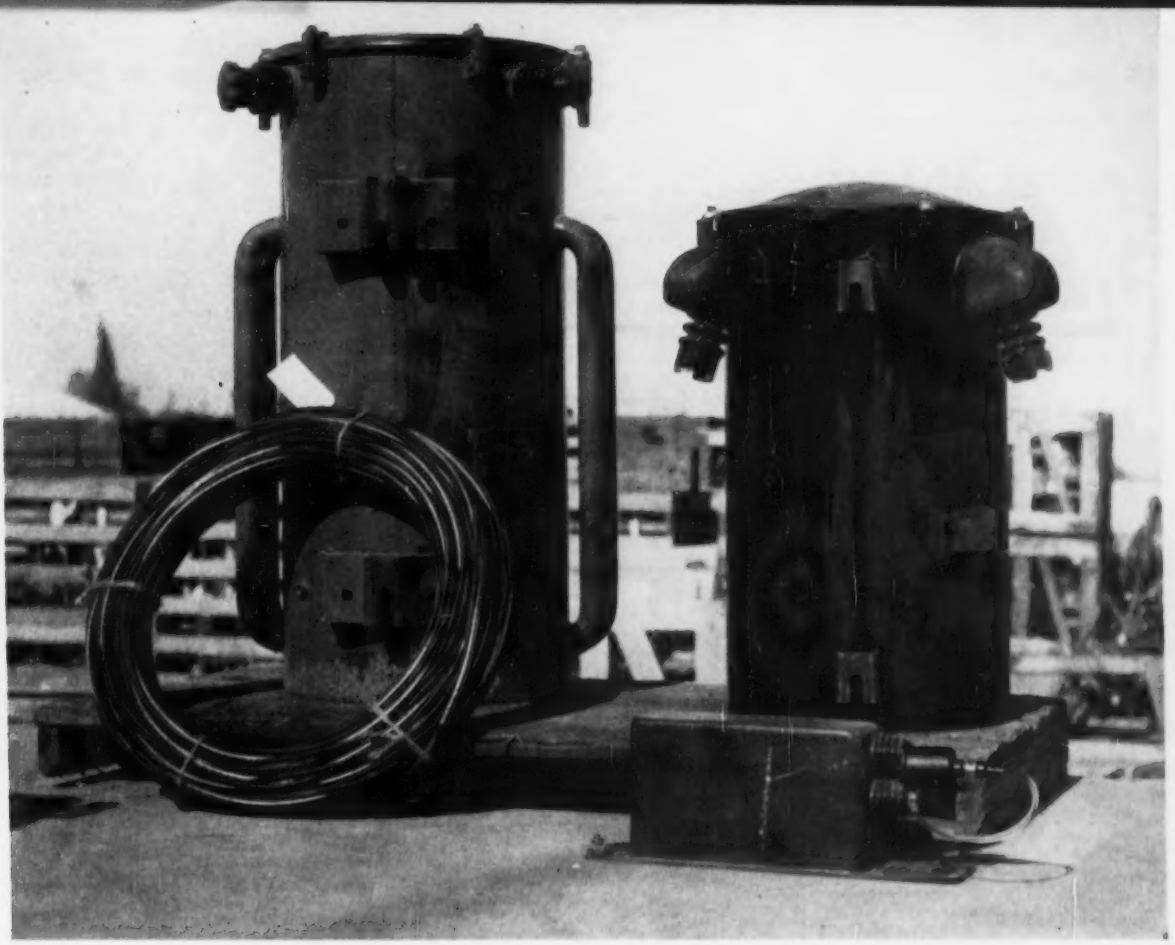
Tower Designs Tested

Seven tower designs ranging from conventional steel tower to woodpole types were used. Of particular interest will be the performance of an experimental H-frame tubular steel tower.

Leadville has boomed with gold, silver, lead and zinc. Two or three years from now, when the data have been refined, it will yield a new resource—high-voltage technology.

Top photo shows an experimental tubular H-frame structure. Sections have been held to length that could be handled in rough country. Center, a close-up of the noise trap at tower 3. Right, dead-end structure 10, looking back across the 2,072-ft Iowa Gulch span. Below, the test substation





A study shows that series capacitors may be used in lieu of larger conductor and more transformer kva, proving that . . .

Series Capacitors Save

L. J. Flanigan and J. L. Gafford
California Electric Power Co., Riverside, Calif.

A series capacitor has an economic application if, and only if, it will do a particular job at a lower cost than some other means of doing the same job.

What jobs will series capacitors do?

1. They will give a desirable voltage rise with a moderate or low power factor load.
2. They will reduce motor starting flicker.
3. They will add reactive kva to the system.
4. A series capacitor will permit increased transformer loading *if* the transformer loading is limited by transformer or secondary voltage drop and *if* the load power factor is moderate or low.

If series capacitors perform any of the above tasks reliably and economically, they should become a weapon in the distribution engineers' cost cutting arsenal. Let us examine these four areas in more detail.

The series capacitor on a distribution transformer will result in an extremely sensitive voltage regulating device. The voltage change is the result of the current flow through the capacitor and transformer.

The voltage regulating benefits of a series capacitor may be economically evaluated in the same manner employed for voltage regulators. The "effective" voltage rise at the customer's meter resulting from the higher regulated voltage plane provides an increased revenue of approximately 1.3% per volt for the lighting and manually controlled heating portions of the load. It should be borne in mind, however, that the series capacitor cannot compensate for voltage changes on the source as does a conventional regulator.

Should a voltage complaint be traced to excessive transformer and/or secondary voltage drop, the trouble can quite often be corrected by the use of a series capacitor instead of the more common method of replacing the transformer with a larger one, especially if the load power factor is 85% or lower and the transformer is less than 100% loaded. In most cases, it is more economical to install a series capacitor rather than replace the transformer.

Voltage Economics

As an illustration of the economics of a series capacitor in the primary of a distribution transformer, the following transformer and secondary have been set up and evaluated.

Transformer—25 kva, 2,400/240-v winding

Secondary—400 ft of 4-6-4 conductor each way from the transformer operating at 240 v

Series capacitor size: 5%

Load data:

Annual load growth: 9% compounded
Demand factor: 85%
Power factor: 85%

Uniformly distributed residential load with a four-hour 85% peak load followed by an average load of 25% of the peak.

Capital recovery factor: 15%

Interest rate: 6%

It was determined that the voltage regulation on this transformer and secondary would exceed ASA standards when an 85% demand factor was reached. Therefore, the following three proposals were studied to provide seven years economic comparison.

Proposal A—Divide the secondary and install a second 25-kva transformer.

Proposal B—Replacing 25-kva transformer with a 37½-kva transformer and increasing the size of the secondary conductor from a 4-6-4 to a 2/0-2-2/0 ACSR after the second year.

Proposal C—Installing a 5% series capacitor in the primary of the distribution transformer and increasing the size of the secondary conductor from a 4-6-4 to a 2/0-2-2/0 ACSR after the second year.

Proposal	Installation Cost	Net Annual Cost
A	305.00	7.28
B	139.00	13.86
C	137.00	1.45

In both proposals B and C, the increase in the conductor size after the second year can be economically justified by the annual losses. The above table shows the installation of a series capacitor to be the most economical.

Flicker

The ability of the series capacitor-transformer combination to reduce voltage fluctuations resulting from motor starting is inherent since the instantaneous voltage rise is proportional to the instantaneous load current. There is no time delay in the "regulator response" as is necessary with induction or step-type regulators.

A flicker problem resulting from motor starting can be solved most effectively by reducing circuit impedance. Regulators are ineffective in eliminating flicker because of their inherent and/or intentional time delay. Series capacitors offer a solution to flicker problems since their effect in the circuit is simply to reduce circuit impedance by canceling all or part of the circuit inductive reactance. Care must be exercised in the application of series capacitors to reduce flicker since the voltage rise produced by the capacitor may produce a *rising* flicker near the transformer.

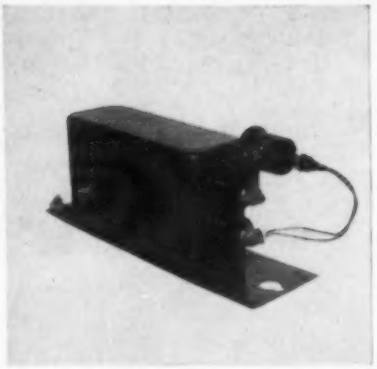
Series Vs Shunt

The *economic* justification for a series capacitor in the neutral of a distribution transformer should be analyzed similarly to the economics of a low-cost feeder regulator on a primary circuit, and should not be compared to the economics of a shunt capacitor application.

The capacitive vars contributed by a series capacitor will, of course, be equal to the vars from an equivalent shunt capacitor when rated current is flowing in the series capacitor. Series capacitors are normally chosen with a continuous current rating equal to twice rated transformer current. Since the vars are proportional to the square of the capacitor current, a series capacitor will only deliver 25% of its available vars when the transformer is 100% loaded and only 6.25% when the transformer is 50% loaded. The following example illustrates the relative cost of kvar hours supplied by shunt and series capacitors.

Assume a two-kvar capacitor, a 10-kva transformer, 70% demand factor and 30% load factor.

If the capacitor were installed shunt on the transformer secondary, it would supply 17,520 kvar hours per year. If it were installed in series with the primary, it would supply only 193 kvar hours per year. The annual cost of the capacitor is about $7. The cost per kvar hour, then, is 0.4 mills for the shunt capacitor and 363 mills for the series capacitor. Series capacitor kvar hours cost



A close up of the series capacitor shows protective gap and mounting

900 times more than shunt capacitor kvar hours.

Series capacitors *are not* an economical source of system vars, but do possess the ability to produce vars when they are most needed, during peak load conditions. Even so, switched shunt capacitors provide a more economical source of variable vars than do series capacitors.

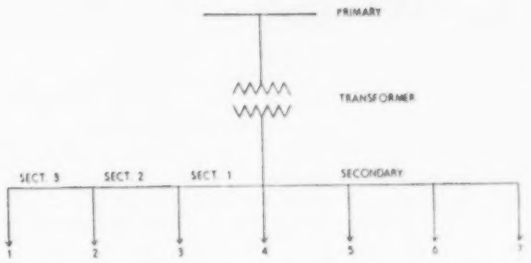
Series Capacitor Limitations

Since the application of a series capacitor reduces the circuit impedance, fault currents will be greater when series capacitors are used than when they are not. The maximum value of the fault current is dependent on the location of the fault, the length of primary involved and the per cent IX of the capacitor, and may have a value as high as 53 times rated transformer current with realistic values of line length and a 5% capacitor.

Ferroresonance is dependent upon transformer per cent exciting current and per cent IX of the capacitor. *Sustained* ferroresonance is also dependent upon transformer load. A 5% capacitor in combination with a modern transformer with less than 2% exciting current will be free of sustained ferroresonance regardless of transformer load. Transient ferroresonance is not impossible with any series capacitor-transformer combination.

The subsynchronous phenomenon occurs during starting of large induction or synchronous motors through a series capacitor and is due to resonance of the motor and circuit parameters at some frequency below line frequency. The result is excessive currents and an attempt on the part of the motor to operate at a speed corresponding to this lower frequency. The phenomenon becomes probable when the capacity of the motor exceeds 10% of the circuit kva capacity. The phenome-

FLICKER ECONOMICS



TRANSFORMER - 25 KVA 2400-240 VOLT
SECONDARY - 400' EACH WAY, 4-6-4 Cu
CUSTOMER DEMAND - 3 KVA AT 90% P.F.

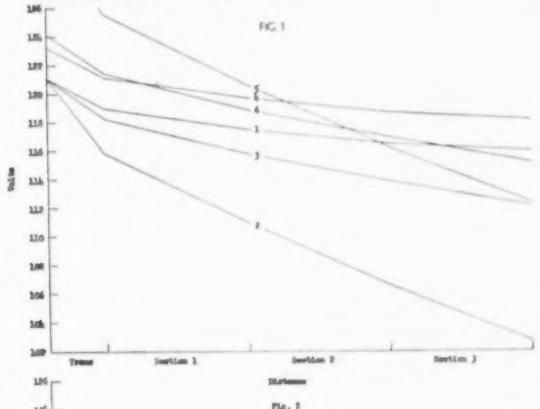


Fig. 2

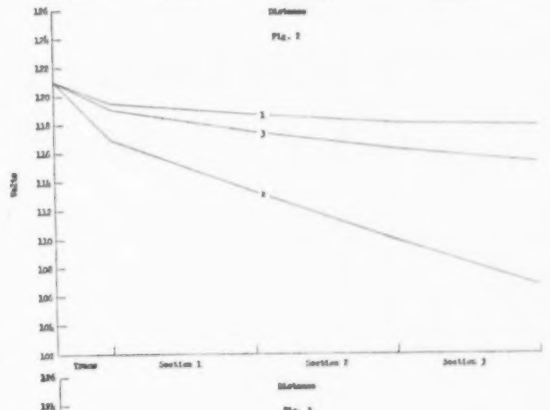


Fig. 3

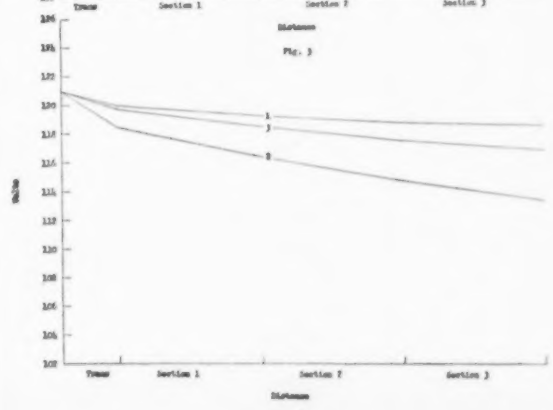


Fig. 4

Consider another typical circuit such as that shown in Fig. 1. A 25-kva transformer is providing service over two 400-ft 4-6-4 cu secondaries to seven customers, each with a 3-kva demand. Customer No. 1 then adds a 5-hp air conditioner. Customers Nos. 1 and 2 then complain about the flicker produced when this air conditioner starts. Further assume that the primary circuit is strong enough to maintain 121 v at the transformer location. Reference to the voltage profile Fig. 2 will indicate the severity of the flicker. Curve No. 1 represents the normal load voltage drop. Curve No. 2 shows the drop during starting and curve No. 3 shows the drop during running of the air conditioner. It may be seen from these profiles that the per cent flicker for customers Nos. 1, 2, 3 and 4 is as follows:

Customer	% Flicker
1	11.0% drop
2	8.2% drop
3	5.4% drop
4	2.6% drop

Customers Nos. 5, 6 and 7 will see approximately the same drop as customer No. 4, essentially the additional transformer drop produced by the motor starting current.

The flicker problem is to be corrected by installing a 5% capacitor in series with the primary of the distribution transformer. Still referring to Fig. 2, curves 4, 5 and 6 correspond respectively to curves 1, 2 and 3, and show conditions with the series capacitor in service. These curves show that the flicker for customers Nos. 1, 2, 3 and 4 would now be as follows:

Customer	% Flicker
1	4.8% drop
2	2.0% drop
3	0.8% rise
4	3.6% rise

The flicker could ideally be corrected to equalize the maximum rise and drop through the choice of a suitable per cent capacitor. Practically, this is not always possible because of the standard sizes of capacitors available.

Voltage profile Fig. 3 shows the results should it be attempted to correct the flicker by reconductoring the secondary to 2°-2-2° ACSR, and replacing the transformer with one rated 37½ kva.

Voltage profile Fig. 4 shows the results obtained when the secondary is reconductored using 2°-1-2° ACSR triplex and a 50-kva transformer is installed. Flicker at customer No. 1 would be 4.3%, comparable to that obtained with a series capacitor.

These two profiles point out the futility of attempting to correct flicker by reconductoring and/or transformer replacement. In order to reduce materially the flicker caused by the transformer impedance, an excessively large transformer would be required and the reactive impedance of the secondary would not be materially reduced with conductor even larger than 2° ACSR.

The cost to apply a 5% series capacitor with protector in this case is approximately $100. The cost to replace the conductor with 2°-2-2° ACSR is $186 and the cost to replace the 25-kva transformer with a 37½ kva unit is $139.

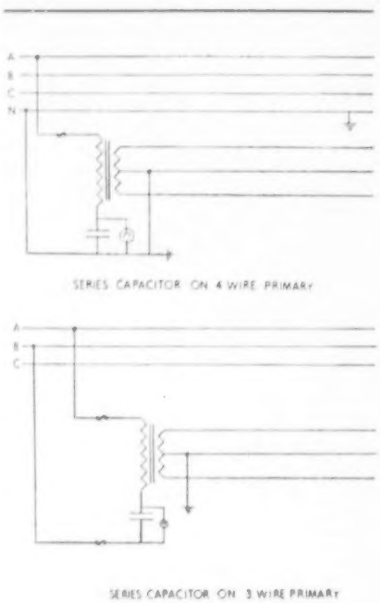
The series capacitor, therefore, is the most economical tool for reducing flicker in an isolated case. It might not be economical if conductor or transformer increase was required for some other reason.

non can be eliminated by shorting the capacitor during motor starting and could, therefore, be controlled by a suitable self-resetting capacitor protector.

Either faults, ferroresonance or subsynchronous resonance will produce excessive capacitor currents and therefore excessive capacitor voltages. Under certain conditions, these excessive voltages may appear across the transformer secondary resulting in possible damage to customer appliances because of overvoltage. A suitable by-passing device for shorting the capacitor under these adverse conditions would render the above effects harmless to system operation.

One manufacturer has recently announced a series capacitor protector capable of repeated operations with automatic resetting to be available at moderate cost. Most protection engineers recommend that series capacitors be protected.

A protector should be designed to by-pass the capacitor whenever the capacitor voltage (as a result of capacitor current) exceeds a value equal to two times rated voltage, and to reset itself when the voltage falls to the rated value. The device must be low in cost and free of routine maintenance. Such a device is described in AIEE conference paper No. 56-810. A protector of these specifications will render harmless the otherwise destructive effects of faults, ferroresonance and subsynchronous resonance, and will enhance general application of series capacitors without concern for expensive maintenance.



Connection diagrams for three- and four-wire distribution circuits

Conclusions

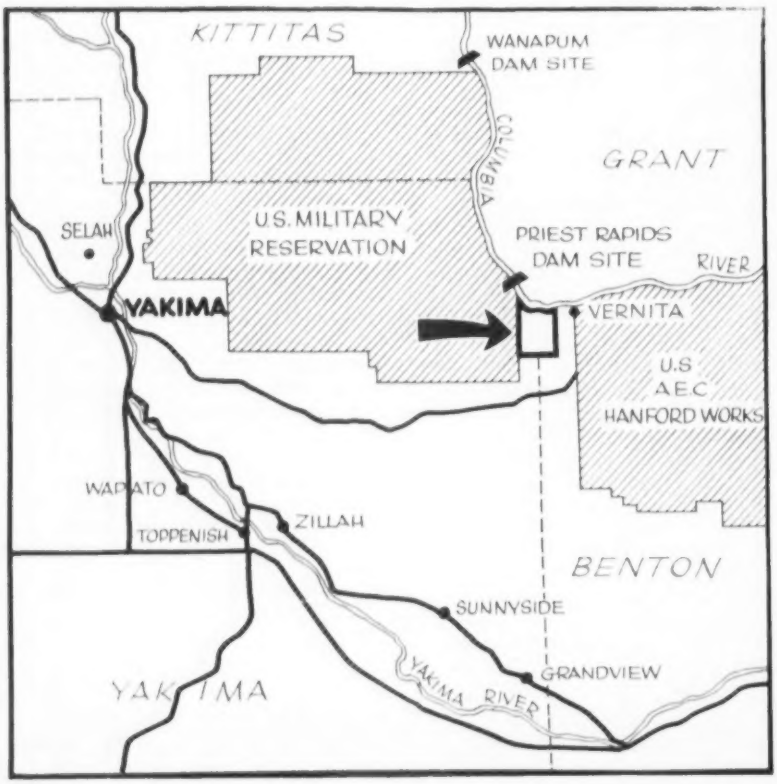
1. Series capacitors should be viewed as an economic tool for the distribution engineer.

2. With proper protection the technical limitations of series capacitors appear to be overcome.

3. Until such time as further experience deems it unnecessary, series capacitor installations should be accompanied by some preliminary engineering. The performance of a series capacitor is governed primarily by the characteristics of the load which it serves. The wide variation in load characteristics and their effects on series capacitor operation dictates the necessity of some engineering for each installation.

4. A number of trial installations combined with an adequate test program could provide valuable experience in the use and benefits of series capacitors.

Series capacitors will not be a "cure-all" for distribution voltage troubles but should prove to be a beneficial tool in correcting some types of low-voltage and flicker complaints at moderate cost.



NW Utilities Set for Atom

Pacific Power and Light Co. has announced the purchase of 14 square miles of land near the Hanford Atomic Energy Works as the possible site of a future atomic energy power station. The historic act on the part of the traditionally hydro-based utility showed foresightedness in anticipating the value of thermal power long before the need is pressing.

In a letter to AEC head, Lewis Strauss, Paul B. McKee reported that Portland General Electric, Montana Power and Washington Water Power are interested in joint development of nuclear facilities on the newly purchased site. The four utility companies have been associated since 1954 in an atomic power study program with the AEC at the Hanford works.

McKee emphasized that hydro was still the least expensive source of power, but that present-day progress made atomic power promising for the foreseeable future.

A look at the record in 1956

Shows Optimism Was Justified

The final sales figures for 1956 are in, showing healthy increases in numbers of electric customers connected to utility lines and in kilowatt-hour consumption. The customer and consumption tables printed here were made up from reports of individual electric utilities and, in so far as possible, follow Federal Power Commission classifications.

Spent $123

Saleswise the West experienced gains enjoyed by the rest of the nation. Data gathered by *Electrical Merchandising* in preparing its Statistical and Marketing issue show that in the 11 Western States the average householder spent about $123 on 15 electric appliances in 1956 as compared to $108 in 1955 and has an investment in these appliances of approximately $1,028. The accompanying table gives a breakdown on some of these appliances.

Television, automatic washers and refrigerators were the big three in 1956 sales. Ranges ran fourth, with about 66% replacement sales.

Air Conditioning Up

Room air conditioners showed a steady gain, all of it in new sales and some of it at the expense of evaporative coolers. Saturation is highest in Utah and southern Nevada. With sales in the 11 Western States totaling $19,140,800 in 1956, there was a 40% increase numerically.

Sales of evaporative coolers were up 13%, almost all replacements except in Washington, New Mexico, Wyoming and Idaho. Big sales numerically were in Arizona, New Mexico and California.

Automatics Win Out

Automatic washers continued to win out over conventional types in most areas. Automatic saturation is up 18.6%, conventional down 13.2%. Joint saturation is now 90.5%.

With an average gain of 26.9%, dryer sales were up everywhere except in Idaho and Nevada. Saturation is highest in Wyoming (29%) with Idaho, Oregon, Montana and Washington following in order.

Ironers Lose

Ironer sales dropped 34.5%, with all Pacific Coast states down. Best jobs this year on this appliance were in Utah and Nevada. Formerly Idaho and Wyoming were in front.

Home freezers, with gains averaging 14%, have the highest saturation in Montana. Highest sales per customer were recorded in Oregon.

Disposers Do Well

Dishwashers and food waste disposers were about equal in dollar volume (just over $3 per home spent in 1956) but numerically food waste units were ahead. In California sales of food waste disposers more than tripled. Dishwasher saturation is highest in Nevada and Arizona, with sales in California, Nevada, Washington and Montana running better than average. For the 11 Western States saturation is 9.1% for disposers, 6.3% for dishwashers.

With more than 100% saturation, radios accounted for $3.13 per home in 1956 and showed an investment

Domestic and Farm Customers—Electric
(Estimated)

State	Residential and Rural	Urban	Rural Nonfarm	Farm
Arizona	254,000	165,006	80,794	8,200
California	4,145,000	3,461,512	564,438	119,050
Colorado	467,500	312,136	114,104	36,260
Idaho	186,500	89,164	59,766	37,570
Montana	187,500	92,774	66,276	28,450
Nevada	68,000	41,721	24,179	2,100
New Mexico	194,000	124,203	52,097	17,700
Oregon	512,000	297,097	161,953	52,950
Utah	214,000	143,734	48,116	22,150
Washington	809,000	538,527	206,323	64,150
Wyoming	90,500	53,232	27,618	9,650
United States	47,415,000	32,733,162	10,169,998	4,511,840

Sources: EEI, REA.

Unit Sales in the 11 Western States

Average Saturation	Refrig.	Range	W.H.	Freezer	Room Air. Cond.	Evap. Cooler	Auto. Washer	Conv. Washer	Dryer	TV
1956	89.3%	33.5%	24.9%	16.4%	3.9%	15.9%	57.6%	32.9%	12.1%	72.9%
1955	89.5	32.2	23.2	17.2	2.4	15.6	39.2	46.7	10.6	69.4
Money Invested Per Home										
1956	$285.76	$86.77	$28.64	$65.60	$12.48	$18.92	$158.41	$48.69	$25.65	$145.40
1955	286.40	83.40	26.68	68.80	7.68	18.56	107.80	69.12	22.47	138.80
Money Spent Per Home										
1956	$23.87	$ 9.89	$ 2.23	$ 8.36	$ 2.69	$ 1.89	$24.20	$ 2.63	$ 7.31	$24.56
1955	20.48	9.15	1.93	7.12	2.11	1.27	18.40	2.98	5.95	26.45
Per Cent of Total Dealer Sales										
1956	19.34%	8.01%	1.81%	6.77%	2.18%	1.53%	19.61%	2.13%	5.92%	20.4%
1955	18.8	8.4	2.1	6.5	2.1	1.2	16.8	2.7	5.9	24.3

Record on Customers and Residential Consumption fo

Taken from the reports of sales executives to

Utility Territory	Average Annual Kwh, Residential 1956	1955	1954	1953	Customers—Residential 1956	1955	Rural 1956	1955	Commercial 1954	1955
PG and E	2,747	2,616	2,458	2,340	1,151,685	1,082,471	342,144	355,311	220,666	217,135
Southern Calif. Edison	2,165	2,033	1,931	1,829	1,180,341	1,111,570	23,920	22,983	138,984	133,108
Los Angeles Dept. of W&P	2,105	1,972.8	1,905.6	1,830	693,286	670,836				
PS of Colorado	2,233	2,109	1,979	1,861	238,824	227,659	8,957	8,706	29,821	29,567
Pacific P&L	6,563	6,108	5,622	5,170	208,250	205,713	30,994	30,476	32,246	31,269
San Diego G&E	2,639	2,575	2,395	2,296	177,414	165,433	57,887	57,921	27,659 (5)	26,570 (5)
B. C. Electric, Vancouver	4,202	3,861	3,440	3,039	214,455	202,880			32,236	31,692
Portland GE	8,103	7,645	6,929	6,228	209,897	203,742	(4)	(4)	26,578	26,086
Seattle City Light	7,786	7,488	7,078	6,485	199,858	195,876			21,714	25,554
Utah P&L	3,891	3,785	3,545	3,417	181,089 (5)	174,778 (5)			19,112	18,480
Puget Sound P&L	7,205	6,540	5,854	5,223	173,567	168,705			18,122	17,557
Southwestern PS	2,264	2,004	1,850	1,693	135,453	129,491	11,893	12,110	26,629	26,274
Arizona PS	2,962	2,682	2,570	2,370	122,617	114,306			22,533	21,378
Montana Power	3,471	3,241	2,942	2,672	120,921	117,332	16,220 (4)	15,900 (4)	17,338	17,006
Washington Water Power	7,845	7,487	6,910	6,371	99,465	96,746	23,903	20,751	14,541	14,145
Sacramento MUD	3,065	2,817	2,688	2,495	111,562	104,575	3,789	3,828	14,188	13,694
Idaho Power	6,463	6,185	5,780	5,454	78,507	76,610	27,697	27,858	15,839	15,527
Hawaiian Elec.	3,983	3,788	3,501	3,221	83,309	79,348			15,468	15,234
Calif. Elec. Power	2,349	2,220	2,130	2,044	75,055	70,577	2,332	2,207	12,176	11,443
Calif. Oregon Power	8,420	8,005	7,510	7,332	70,921	69,510	1,449	1,364	13,990	13,750
PS of New Mexico	2,132	1,941	1,826	1,736	71,821	68,339	717	695	9,348	9,454
El Paso Elec.	2,936	2,643	2,527	2,382	69,321	66,237	262	270	8,635	8,548
Tucson GEL&P	2,521	2,255	2,139	2,093	53,924	50,322	334 (8)	350 (8)	8,652	8,449
B. C. Power Commission	3,279	2,796	2,448	2,076	51,700	47,600			8,500	7,800
Tacoma PU Dept.	9,120	8,504	8,212	7,244	53,060 (8)	52,612	0	0	5,855	5,755
PUD No.1 of Snohomish County, Wn.	7,746	6,833	5,857	5,254	48,639	47,219			4,609	4,470
Salt River Power Dist.		3,879	3,835	3,575	47,798	42,853	315		3,878	3,326
B. C. Elec., Victoria	3,605	3,317	2,998	2,672	41,896 (5)	40,272 (5)			6,232	6,219
Pasadena L&P Dept.	2,235	2,093	1,955	1,872	41,349	40,938			6,146	6,099
Southern Colorado Power	2,217	2,068	1,957	1,882	34,337	33,559	4,813	4,621	5,432 (16)	5,370 (16)
Burbank PS Dept.	2,330	2,198	2,140	2,035	30,520	30,300			4,420	4,286
Sierra Pacific Power	4,675	4,548	4,274	4,073	30,145	28,502			5,180	4,956
PUD No. 1 of Clark County, Wash.	8,887	8,149	7,206	6,485	27,692	27,045			3,090	2,987
Southern Nevada Power	9,777	10,094	9,864	10,299	22,610	21,765			6,841	6,897
Calif.-Pacific Utilities	5,729	5,464	4,952	4,817	21,794	22,066	2,369	2,453	5,058	4,836
Imperial Irrig. Dist.		5,251	4,891	4,500	21,225	20,771	929	923	4,214	4,125
Colorado Central Power	2,490	2,345	2,177	2,139	17,780	17,031	6,589	5,827	1,942	1,855
Modesto Irrig. Dist.	3,524	3,333	3,154	2,926	21,517	20,919	466	547	2,602	2,581
Eugene W&E Board	8,990	8,225	7,533	6,988	22,247	21,396			3,275	3,303
Riverside PU Dept.	2,880	2,896	2,508	2,352	22,452	21,441			2,144	1,978
Grays Harbor, Wash., PUD No. 1	7,849	7,175	6,295	5,583	12,403	12,097	5,177	4,991	3,436	3,224
Hilo Elec. Light	2,534	2,539	2,303	1,973	14,473	12,972			3,257	2,813
Anaheim LP&W Dept.	1,521				14,411	11,619			2,106	1,986
PUD No. 1 of Chelan County, Wash.	7,172	6,576	5,392	5,361	13,494	11,927			1,938	1,661
Alameda Bureau of Electricity	2,238	2,136	2,069	1,874	13,671	13,451			1,315	1,316
Cheyenne LF&P	2,485.34	2,356.62	2,202.51	2,067.21	12,864	12,683	250	248	1,806	1,816
Home L&P, Greeley, Colo.	2,951	2,907	2,795	2,662	8,335	7,886	3,232	3,363	2,597	2,501
PUD No. 1 of Grant County, Wash.	13,319	12,647	10,659	8,791	11,023 (5)	10,525 (5)	252 (11)	244 (11)	2,123 (8)	2,021 (5)
PUD No. 1 of Lewis County, Wash.	7,664	6,898	6,192	5,500	10,612	10,494			1,019	1,001
Central Lincoln PUD, Newport, Ore.	8,899	8,420			9,384	9,152			1,876	1,799
Maui Elec.	3,012	2,892	2,688	2,532	8,598	8,624			1,503	1,503
Chugach Elec. Assn.	288	247	207	168	9,230	6,813	643	820	454	320
New Mexico Elec. Service	2,488	2,167	2,002	1,816	8,166	7,586	38	29	1,400	1,287
Telluride Power	4,254	3,922	3,631	3,300			7,164	7,437	1,586	1,532
PUD No. 1 of Okanogan County, Wn.	7,832	7,040	6,395	5,801	6,726	6,576	928	806	1,087	1,046
Anchorage L&P Dept.	2,894.33	2,554.42	2,295.82	2,264.18	6,186 (5)	5,934 (5)			1,680 (8)	1,580 (5)
PUD No. 2 of Pacific County, Wash.	8,607	8,620	7,907	6,908	6,004	5,816	0	0	1,268	1,288
Intermountain Rural Elec. Assn.	2,301	2,076	1,593	1,476	2,105	2,061	4,167	3,529	749	693
Franklin County, Wash., PUD	9,373	8,566	7,220	6,675	5,081	4,930	200	175	1,229 (8)	1,281 (5)
Lea County, N. M., Elec. Co-op	206	177	160	136	2,856	2,610	1,307	1,207	775	719
City of Mesa, Ariz.	2,944	2,665	2,598	2,367	4,210	4,034	16	18	905	887
Fairbanks Municipal Utilities	2,544	2,199	2,193	2,250	4,435	4,590	0	0	737	757
Lane County Elec. Co-op	932	836	790	753	1,558	1,567	3,132	3,127	297	295
Southern Utah Power	4,574	4,355	4,161	4,016	3,778	3,701	77	72	808	754
Yampa Valley, Colo., Elec. Assn.	216	196			2,421	2,321	924	903	733	685
Loveland, Colo., E&L	2,014	1,941	1,831	1,819	3,445	3,309			578	560
Poudre Valley REA, Colo.	4,341	4,121	3,924	3,645	29 (14)	26 (14)	3,281	3,165	47	29
Benton, Wash., Rural Elec. Assn.	9,784	9,108	8,068	7,034	588	554	2,418	2,374	184	
Bountiful City, Utah, P&L	374	362	360	354	3,408	2,964	0	0	156	150
Ketchikan PU	5,291	5,475	5,467	5,893	2,773 (5)	2,610 (5)			527	525
Rawlins, Wyo., Elec.	2,418	2,168	1,954	1,794	2,223	2,195	201	209	461	453
Raton, N. M., PS	3,309	3,145	2,920	2,876	2,392	2,406	0	0	393	399
Lamar, Colo., Elec. Dept.	1,762	1,882	2,043	1,863	2,354	223	1,576	1,599	97	101
Roosevelt County, N. M., Elec. Co-op	376	340	326	293	225	2,378	76	75	536	536
Elko Lamoille Power, Nev.	2,486	2,366	1,896	1,818	2,035	2,026			471	494
Graham County, Ariz., Elec. Co-op	1,703	1,485	1,442	1,379	1,147	1,139	949	958	205	202
Ely L&P	1,740	1,650	1,614	1,529	1,805	1,747	5	5	350	339
Tri County Elec. Assn., Wyo.	224	204			455	435	982	959	346	355
Truckee Carson Irrig. Dist.	3,500 (9)	3,100 (9)			577	550	1,129	1,125	168	160
Beartooth Elec. Co-op, Mont.	2,300	2,200	2,130	2,080	134	129	1,473	1,415	175	174
Heber, Utah, L&P	6,300	6,033			1,104	1,100	207	205	141	140

(1) Includes railroads and railways. (2) Interdepartmental. (3) Includes industrial. (4) Included in other classification. (5) Includes rural. (6) Includes all public authorities. (7) Includes miscellaneous and other classifications. (8) Irrigation. (9) Estimated. (10) Includes small industrial. (11) Nonresidential. (12) Miscellaneous oil field connections. (13) Heat. (14) Urban. (15) Seasonal. (16) New classification "General Power."

for Electric Utilities in the 11 Western States

to Electrical West for the 12-month period

Industrial 1956	Industrial 1955	Street Lighting 1956	Street Lighting 1955	Public Authorities 1956	Public Authorities 1955	Other Electric Utilities 1956	Other Electric Utilities 1955	Total Customers 1956	Total Customers 1955	Utility Territory
37,350	37,119	1,376	900	24	25	33	36	1,753,278	1,692,997	PG and E
30,068	29,659	1,516	1,331	10,501	8,987	10①	10①	1,385,340	1,307,648	Southern Calif. Edison
133,788	131,152	1,671	1,624	311②	305②	2	3	829,558	803,920	Los Angeles Dept. of W&P
7,751	7,505	102	95	1,232	1,126	7	7	286,694	274,665	PS of Colorado
3,427	3,421	318	259	550	483	18	20	275,803	271,641	Pacific P&L
		103	99	104	107	9	9	263,176	250,139	San Diego G&E
4,661	4,533	39	34					251,391	239,139	B. C. Electric, Vancouver
80	72	225	204	1,093	1,082	1	1	237,874	231,187	Portland GE
283	241	3	3	870①	1,046①	1		222,729	222,720	Seattle City Light
3,103	2,971	415	406	77	67	33	34	203,829	196,736	Utah P&L
281	282	189	153	143	147	9	12	192,311	186,856	Puget Sound P&L
1,785	1,801	102	101	973	943	91	91	176,926	170,811	Southwestern PS
1,669	1,465	100	119	171	171	8	8	147,098	137,447	Arizona PS
2,346	2,392	457	439	11	11	68	55	141,141	137,235	Montana Power
707	693	232④	229④			13	13	138,861	132,577	Washington Water Power
643	578	101	93			1	1	130,284	122,769	Sacramento MUD
77	75	154	145			5	5	122,279	120,220	Idaho Power
197	181	160	152					99,134	94,915	Hawaiian Elec.
244	255	138	118	64	16	14	11	90,023	84,627	Calif. Elec. Power
421	424	162	110	76	73	5	4	87,024	85,235	Calif. Oregon Power
354								82,262⑦	78,500⑦	PS of New Mexico
190	190	7	7	491	493	2	2	78,908	75,747	El Paso Elec.
142	115	5	6	0	0	0	0	63,057	59,242	Tucson GEL&P
1,087	1,007	91	84					61,378	56,491	B. C. Power Commission
1,301	1,269	34	31	9	9	18	18	60,277	59,694	Tacoma PU Dept.
118	116	20	16	31	28	2	2	53,419	51,851	PUD No. 1 of Snohomish County, Wash.
157	270	8	5	66	66	1	7	52,262⑦	47,050⑦	Salt River Power Dist.
595	594	6	6					48,729	47,091	B. C. Elec., Victoria
60	59			358	366			47,913	47,462	Pasadena L&P Dept.
97	91	146	146	22	22	6	7	44,853	43,816	Southern Colorado Power
1,395	1,359	1	1					36,336	35,946	Burbank PS Dept.
87	86							35,412	33,544	Sierra Pacific Power
10	9			121	127			30,913	30,168	PUD No. 1 of Clark County, Wash.
8	9	3		4	4	2	1	29,468	28,676	Southern Nevada Power
26	27	43	42	18	17	1		29,309	29,441	Calif.-Pacific Utilities
941	907	24	25	7	7	2	1	27,432	26,759	Imperial Irrig. Dist.
86	61	20	16	283	216	1	1	26,701	25,007	Colorado Central Power
756	731	3	29	238	98	1	1	25,583	24,906	Modesto Irrig. Dist.
		7	5					25,529	24,704	Eugene W&E Board
768	697							25,364	24,116	Riverside PU Dept.
26	25	27	21	313	311	1	1	21,383	20,670	Grays Harbor, Wash., PUD No. 1
635	255	1	1					18,365	16,041	Hilo Elec. Light
								16,517	13,605	Anaheim LP&W Dept.
34	34	11	10	2	5	2	4	15,481	13,641	PUD No. 1 of Chelan County, Wash.
331	358	2	2	138	129			15,457	15,256	Alameda Bureau of Electricity
6	6	2	2	20	3	0	0	14,948	14,750	Cheyenne LF&P
15	13	30	32	14	12			14,223	13,807	Home L&P, Greeley, Colo.
		25	24	76	71			13,499	12,885	PUD No. 1 of Grant County, Wash.
48	46	15	13	307	301			12,001	11,855	PUD No. 1 of Lewis County, Wash.
53	49	10	10			0	0	11,323	11,010	Central Lincoln PUD, Newport, Ore.
326	312	98	94					10,525	10,533	Maui Elec.
24	26	18	15	25	21	0	1	10,394	8,016	Chugach Elec. Assn.
345	270			147	124	0	0	10,096	9,296	New Mexico Elec. Service
29	26	38	37	250	244	15	15	9,082	9,291	Telluride Power
		9	9			1	1	8,766	8,451	PUD No. 1 of Okanogan County, Wash.
		1	1	1	1	0	0	7,868	7,516	Anchorage L&P Dept.
10	8	6	6	149	127			7,437	7,245	PUD No. 2 of Pacific County, Wash.
11	14	16	13	8	8			7,056	6,318	Intermountain Rural Elec. Assn.
92⑥	71⑥	14	11					6,616	6,468	Franklin County, Wash., PUD
236	236	5	5	56	56	758⑩	537⑩	5,993	5,370	Lea County, N. M., Elec. Co-op
		68	76	15	15			5,237	5,052	City of Mesa, Ariz.
2	5	1	1	19	30	0		5,194	5,383	Fairbanks Municipal Utilities
49	15	2	2	55	62	1		5,094	5,068	Lane County Elec. Co-op
37	37	20	20	24	18	1	1	4,745	4,603	Southern Utah Power
40	29	7	7	61	67	1	1	4,187	4,013	Yampa Valley, Colo., Elec. Assn.
114	116	16	16	25⑨	27⑨			4,178	4,028	Loveland, Colo., E&L
1	1	372⑥	347⑥	33	30			3,763	3,598	Poudre Valley REA, Colo.
197⑥	175⑥	1	0	174⑬	174⑬			3,567	3,449	Benton, Wash., Rural Elec. Assn.
0	0	1	1	1	1	0	0	3,566	3,116	Bountiful City, Utah, P&L
27⑯	5	1	1	1	1	0	0	3,329	3,142	Ketchikan PU
270	275	1	1					3,166	3,133	Rawlins, Wyo., Elec.
293	297	1	1	0	0	0	0	3,079	3,103	Raton, N. M., PS
17	15	5	4	1	1	3	3	2,992	3,012	Lamar, Colo., Elec. Dept.
7	6	1	1	50	50	808	749	2,764	2,729	Roosevelt County, N. M., Elec. Co-op
1	1	1	1	1	1			2,509	2,523	Elko Lamoille Power, Nev.
10	9	1	1			2	2	2,314	2,311	Graham County, Ariz., Elec. Co-op
		2	2	2	2			2,164	2,095	Ely L&P
4	4	3	3	55	47	112⑮	104⑮	1,957	1,907	Tri County Elec. Assn., Wyo.
5	5	4	4	24	24	2	2	1,935⑦	1,896⑦	Truckee Carson Irrig. Dist.
		2	2					1,784	1,720	Beartooth Elec. Co-op., Mont.
		3	3			1	1	1,456	1,349	Heber, Utah, L&P

The West's Appliance

	Residential Customers	Refrigerators	Ranges	Water Heaters	Freezers	CLM Lamp Sales	Room Conditioners	Washers Automatic	Washers Conventional
ALASKA									
Ketchikan PU	2,773①	250	240	150	50			200	50
ARIZONA									
Arizona PS	122,617	9,500	2,700	450	2,500	8,500⑤	5,500	12,000	2,000
Mesa City Utilities	4,210	400	50	10	300		700	70	400
Salt River Power Dist.	47,798	3,985	2,022	324	1,614		2,006	3,650	1,541
Tucson GEL&P	53,924	2,500	800	225	700		225	2,700	900
BRITISH COLUMBIA									
B. C. Elec., Vancouver	214,455	78,509	98,691	72,275	11,728			27,938	152,175
B. C. Elec., Victoria	41,896①	3,261	1,876	430	738	4,965		1,132	1,390
CALIFORNIA									
Alameda PU Dept.	13,671	250	200	5	100			250	50
Burbank PS Dept.	30,520	250	200	20	15		300	325	75
Calif. Elec. Power	75,055	2,600	650	400	200		2,000	3,500	1,000
Calif.-Pacific Utilities	21,794	1,011	989	715	468		175	1,100	875
Imperial Irrig. Dist.	21,225	1,600	405	220	240		2,400	1,600	850
Los Angeles Dept. of W&P	693,286	78,100	8,000	1,700	4,000		13,600	76,745	6,715
PG and E	1,151,685	88,200	46,100	10,300	18,500		7,100	120,000⑥	
Pasadena MU	41,349		703②	75					
Riverside PU Dept.	22,452		1,130②	23					
Sacramento MUD	111,562①	10,296	6,688	1,726	2,305		6,526	13,637	1,726
San Diego G&E	177,414	21,100	6,375	2,550	6,200		1,875	25,100	4,235
Southern Calif. Edison	1,180,341	164,960	27,940	6,170	13,670		45,600		
COLORADO									
Colorado Central Power	17,780	375	400	62	160		75	450	250
Intermountain Rural Elec. Assn.	2,105	58	23	80	42	20	6	47	30
Lamar L&P Dept.	2,354	65	40	27	40		32	60	10
PS of Colorado	238,824	23,500	12,050	1,980	4,200	10,800	1,300	23,900	4,700
Southern Colorado Power	34,337	1,671	611	140	376		98	1,953	762
Yampa Valley Elec. Assn.	2,421	400	200	200	300		10	200	50
HAWAII									
Hawaiian Electric	83,309	7,000	4,277	4,901	1,200		125	6,600	1,000
Hilo Elec. Light	14,473	500	383	354	150			250	200
Maui Electric	8,598	352	312	242	62		21	370	21
IDAHO									
Idaho Power	78,507	11,985④	8,310	6,794	4,405	2,000	900	13,000	5,000
MONTANA									
Montana Power	120,921①	8,530	8,460	2,090	3,248			12,200	
NEVADA									
Sierra Pacific Power	30,145	2,288	1,592	1,055	420				
Southern Nevada Power	22,610	1,098	756	360	282		132	960	72
NEW MEXICO									
N. M. Elec. Service	8,166①	698	188	10	378		1,289	825	112
PS of N. M.	71,821	5,516	2,101	326	2,210			6,949⑥	
Raton PS	2,392								
Roosevelt County Elec. Co-op.	1,801①	40	20	11	65		5	66	
OREGON									
Calif. Oregon Power	70,921	3,760	3,561	4,500	1,887		241	4,200	737
Pacific P&L	208,250	22,123	24,347	12,954	11,297		1,457	38,155	8,093
Portland GE	209,897①	17,500	17,000	12,000	8,300		200	19,500	3,000
TEXAS									
El Paso Electric	69,321	7,449	2,832	2,410	1,833		1,499		
Southwestern PS	135,453	8,172	2,626	544	2,870		8,754	11,787	1,507
UTAH									
Southern Utah Power	3,778								
Telluride Power	7,164④	199	283	212	128			257	
Utah P&L④	181,089①	13,051	11,434	5,538	6,244	46,027⑤	5,023	17,046	5,774
WASHINGTON									
PUD No. 1 of Chelan County	13,494	743	797	819	301		26	841	138
PUD No. 1 of Clark County	27,692	1,500	1,500	1,500	500		50	1,000	200
PUD No. 1 of Franklin County	5,081								
PUD No. 2 of Grant County	11,023①								
PUD No. 1 of Grays Harbor County	17,580①		906	925					
PUD No. 1 of Lewis County	10,612								
PUD No. 1 of Okanogan County	6,726	50	75	20	75		10	30	20
PUD No. 2 of Pacific County	6,004	210	240	270	100			540	95
PUD No. 1 of Snohomish County	48,639	3,000	3,000	3,000	800		10	1,800	400
Puget Sound P&L	173,567	8,752	12,026	9,285	2,086			9,536	264
Seattle City Light	199,858		15,000	12,000⑨					
Tacoma Dept. of PU	53,060⑤	5,908	7,920	2,970	1,485			2,672	1,298
Washington Water Power	99,465	9,113	9,544	5,962	4,804	17,216⑤	1,478	11,232	2,882
WYOMING									
Cheyenne LF&P	12,864	850	700	75	750	800	125	1,200	600

① Includes rural. ② Taken from installation figures. ③ Estimated. ④ Includes Western Colorado Power. ⑤ Includes all floor and table lamps. ⑥ Includes both types. ⑦ From manufacturer and distributor reports. ⑧ Includes comb. ref.-freezers. ⑨ Commercial type only.

per home of about $33. Vacuum cleaners had an average saturation of 81% and investment per home was about $66.

Utility Reports

Utilities reporting customer and consumption figures are listed according to number of customers. In studying these and the appliance sales tables, the following comments from individuals may be helpful:

Southern California Edison: Figures on appliance sales are estimates made from a saturation study secured by mail under the random selection method, with 10,000 cards sent out and a return of 7,500 twice during the year.

Los Angeles Department of Water & Power: Data on appliance sales were compiled from industry-wide totals of distributor sales to city and county dealers and adjusted to the department's service area. Where records were not available for the

Sales Record for 1956

Ironers	Dryers	Vacuum Cleaners	Dishwashers	Waste Disposers	Radio	Television	Utility Merchandise Yes	Utility Merchandise No	Appliance Sales Estimated	Appliance Sales Dealer Reports	
											ALASKA
25	250	125	40	10	500	400		X	X		Ketchikan PU
											ARIZONA
500	850		950	750	18,000	14,000		X		X	Arizona PS
100	100	200	200	100	500	500		X	X		Mesa City Utilities
61	487		542	467		3,750		X		X①	Salt River Power Dist.
100	200	1,250	300	225	2,750	2,800		X		X	Tucson GE&P
											BRITISH COLUMBIA
9,249	10,186		2,584	1,256	289,386	149,251		X	X	X	B. C. Elec., Vancouver
39	529	2,287	88	37	2,412	6,728		X		X	B. C. Elec., Victoria
											CALIFORNIA
50	200	200	75	50	300	500		X	X		Alameda PU Dept.
15	175	125	30	175	300	800		X	X		Burbank PS Dept.
50	500						X			X	Calif. Elec. Power
425	734	2,800	190	210		2,900		X	X	X	Calif.-Pacific Utilities
30	80							X	X	X	Imperial Irrig. Dist.
	9,716					76,781		X	X	X	Los Angeles Dept. of W&P
	46,000		21,100	21,400		163,900		X		X	PG and E
											Pasadena MU
								X			Riverside PU Dept.
	8,784		2,710	2,995		18,379		X		X	Sacramento MUD
	2,815	17,000	2,850	7,750	57,000	46,970		X		X①	San Diego G&E
	32,440		23,500			171,600		X	X		Southern Calif. Edison
											COLORADO
	350							X	X		Colorado Central Power
3	30	22	9	18	50	60		X	X		Intermountain Rural Elec. Assn.
15	30	200	5	15	234	100		X	X		Lamar L&P Dept.
	17,800		1,100	4,300		32,000	X		X		PS of Colorado
22	628	995	141	643	1,648	2,624	X		X	X	Southern Colorado Power
20	300	100	10	20	200	200		X	X		Yampa Valley Elec. Assn.
											HAWAII
400	1,063		750	1,000				X	X		Hawaiian Electric
	87	150	70	70	300	900		X	X	X	Hilo Elec. Light
	21	131		25	306	881	X		X	X	Maui Electric
											IDAHO
2,600	6,257	16,000	1,200	2,400	13,000	15,000	X		X	X	Idaho Power
											MONTANA
	11,100	4,500	1,200			18,190		X	X		Montana Power
											NEVADA
								X	X	X	Sierra Pacific Power
174	234	450	250	138	900	750		X	X	X	Southern Nevada Power
											NEW MEXICO
24	123	120	66	50		2,062		X		X	N. M. Elec. Service
977	989		391	240		10,259		X		X	PS of N. M.
						600		X	X		Raton PS
	17	15	5		2	165		X	X		Roosevelt County Elec. Co-op.
											OREGON
177	3,276		453	143		10,277		X	X		Calif. Oregon Power
1,236	30,870		3,113	978	40,977	45,506		X		X	Pacific P&L
1,450	16,500		1,250	1,250				X	X		Portland GE
											TEXAS
	870		885			16,785	X			X①	El Paso Electric
469	3,409		724			15,614		X	X		Southwestern PS
											UTAH
								X			Southern Utah Power
	55							X		X	Telluride Power
3,285	9,615	22,571	2,312	3,320	23,169	22,201		X		X	Utah P&L④
											WASHINGTON
				79	682	1,265		X		X	PUD No. 1 of Chelan County
14	365	273	114	100	1,500	2,000		X		X	PUD No. 1 of Clark County
200	1,000	700	150					X			PUD No. 1 of Franklin County
	400							X			PUD No. 2 of Grant County
								X	X		PUD No. 1 of Grays Harbor County
								X			PUD No. 1 of Lewis County
10	25	75	10	5	100	200		X	X		PUD No. 1 of Okanogan County
65	410	125	75	35	510	500		X	X		PUD No. 2 of Pacific County
200	1,000	2,500	1,500	500	3,000	4,000		X	X		PUD No. 1 of Snohomish County
255	7,732		2,754	618		10,761		X	X①		Puget Sound P&L
								X	X		Seattle City Light
	4,659					8,250		X	X		Tacoma Dept. of PU
425	8,740	8,437	1,498	522	13,540	20,074		X	X		Washington Water Power
											WYOMING
75	400	500	150	200	1,500	1,600	X		X		Cheyenne L&P

year, nine-month sales were projected.

Representative Figures

Puget Sound Power & Light: Appliance sales are based on reports of representative distributors.

Idaho Power: Carries a limited stock of housewares for the public; sells major appliances to employees only.

Hawaiian Electric: Final figures represent sales on Oahu only and on HECO retail lines. Merchandising is through Honolulu Electrical Products Co., a wholly owned subsidiary.

Sierra Pacific Power: Figures are actual reports through October, estimates for November and December.

Revenues Up

California Pacific Utilities: Electric revenues increased 4.9% over 1955, due in part to increased elec-

tric use. Availability of TV in many rural communities resulted in some decrease in major appliance sales, though dollar volume for many dealers was increased substantially by sales of TV sets.

Merger Affects Figures

Hilo Electric Light: The comparatively high percentage of new customers added in 1956 and slight drop in average annual kwh use per customer is accounted for by recent merger with Kona Light & Power, whose 1,400 customers were averaging 894 kwh annually at time of merger.

Franklin County PUD: Dealers report 1956 sales were down somewhat from 1955 levels but that room air conditioners, freezers, dryers and ironers made substantial gains during the year.

Benton Rural Electric: Units sold would about follow the average with most activity in TV, dryers, automatic washers, water heaters and ranges.

Ketchikan Public Utilities: Reclassification of rate schedule effective July 1, 1956, eliminated the industrial classification and created a new one, "General Power," which covers 25 hp or over.

City of Lamar: Annual kwh use reflects prolonged drought.

Roosevelt County Electric Co-op: Figures are based on actual count from loan vouchers plus 25%.

Utah Power & Light's figures on room conditioners include 4,620 evaporative type, those of Sacramento MUD, 4,109. In addition to the appliances listed, 900 combination washer-dryer combinations were sold on San Diego Gas & Electric lines; 1,263 on the SMUD system.

In Portland, manufacturers set up displays around the auditorium. Here Wes Dunn, PP&L residential sales manager, tells advantages of multiple household circuits to Naida Whybark, Oregon Wheat League home economist. The 200-amp meter box became minimum service entry equipment in Portland Jan 1; figured in several displays

Nation-wide live telecast

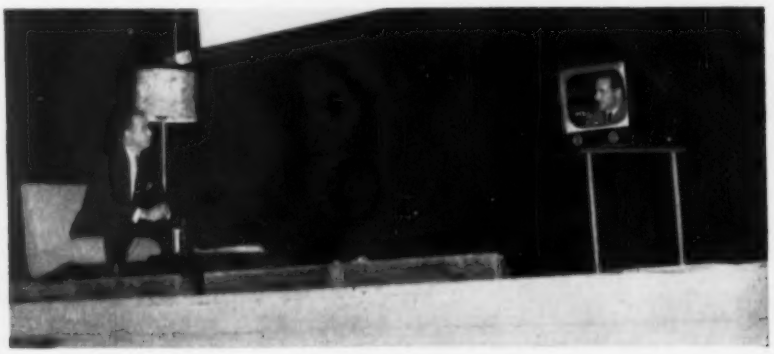
Tells LBE Success Story

Success stories—actual cases where the Live Better . . . *Electrically* program has built consumer demand for appliances, lighting and adequate wiring—were told by the industry and its allies on the second LBE closed-circuit telecast from New York on Jan. 30. As they did at the first telecast in 1956, utilities and leagues sponsored the showing, invited dealers, distributors, contractors, builders and bankers to be their guests.

Among the Westerners who appeared on the telecast to tell their success stories were R. L. Wilkinson, manager of the Inland Empire Chapter of NECA, who told about the chapter's Selectric home in Spokane; Clark Chamberlain, secretary-manager of the San Diego Bureau of Home Appliances; Ed Meise, San Diego Gas & Electric Co. residential sales manager. Southern California was featured twice—for its all-electric tract homes and an aggressive co-operative sales promotion by Los Angeles Department of Water & Power and Southern California Edison.

As before, the program will be repeated in kinescope at industry meetings all over the West. Sponsors of the live telecast were: Phoenix, Arizona Public Service and Salt River Power District; Sacramento, Sacramento Municipal Utility District and the Sacramento Valley Electric League; Salt Lake City, Utah Power & Light and the Intermountain Electrical Assn.; San Diego, San Diego Gas & Electric and the Bureau of Home Appliances; San Francisco, PG and E and Northern California Electrical Bureau; Seattle, City Light; Spokane, Washington Water Power and Inland Empire Electrical League; Portland, Pacific Power & Light and Portland General Electric; Denver, Public Service of Colorado. Most utilities plan later LBE programs.

R. L. Wilkinson (left), manager Inland Empire Chapter, NECA, was one of the Westerners who appeared on the second LBE telecast. At right: In San Francisco, PG and E put a man in the box to tell about its 1957 promotion program



Twelve appliance displays at GEA's Burlingame branch were designed to show new trends as well as late models. In these pictures Leonard S. Oppenheim, sales manager in charge of kitchen modernization, shows washer and dryer installed in the bathroom, where much of the laundry accumulates, and a kitchen that combines convenience and good styling in small space. With him in picture at left is Vern L. Hobson, manager of dealer sales, and at right R. O. Donegan, manager of advertising and sales promotion for the northern California-Nevada Region of GEA

Dealer, builder, consumer aids provided in

New GEA Facilities

Complete facilities for displaying appliances in model room groupings, individually and in an operating kitchen are provided in two new distribution centers opened by General Electric Appliances Co. on the West Coast. The two centers are at 2957 E. 46th St., Los Angeles, first to be built following formation of GEA, and at 1649 Adrian Road, Burlingame, Calif., third such GEA facility in the nation.

Each structure—a combination regional warehouse, sales and service facility—is a distribution center for major appliances and TV receivers, operating as a department of the division of Louisville. S. B. Maher is manager of the southern California GEA branch, H. P. Gough of the northern California operation.

The Burlingame facility, opened last month and similar in layout and features to the one at Los Angeles, is pictured on these pages. It is a $1,500,000 building with 130,000 sq ft of warehouse, display and office space. The 100,000-sq-ft warehouse can be expanded to 175,000 sq ft as needed.

An auditorium seating 120 will be used for dealer, service, club, employee and training meetings. It has a complete electric kitchen, with revolving stage for appliance previews and cooking schools.

A section of display floor showing the attractive vignettes and ceiling lighting

Complete Kitchens

Model kitchens and other vignettes were installed to help dealers and builders whose customers are shopping for complete installations, including wiring, flooring and cabinets. Under a General Electric Credit Corp. finance plan, homeowners are offered a five-year finance plan whereby they may have complete kitchen modernization with payments as low as $20 per month. This plan covers appliances, cabinet work, plumbing, flooring, decorating, wiring, countertops, lighting and other accessories.

The 3,500-sq-ft permanent display room in Burlingame contains about 120 major appliances and cabinet styles in all mix or match colors as well as accessories. The rooms will be changed periodically to incorporate new models and design trends.

Frank Falge (center), Live Better . . . Electrically director for eight Western states, was a main speaker at the Appliance and TV dinner. With him here at the no-host cocktail party preceding the dinner are Gerry Gajarian, W. J. Rockett, both PG and E, Herb Atwater, Leo J. Meyberg, Marty O'Connor, PG and E. In back, Ed Kerns, Pacific Coast Gas Assn., and Walter Lind, PG and E

Winter Market Well Attended

With attendance of more than 16,000, the Winter Market at San Francisco's Merchandise Mart, Feb. 4-8, measured up to last year's record. Buying too was in good volume, according to reports from exhibitors.

Some 350 attending the Radio, TV and Appliance dinner Wednesday night had the first kinescope viewing of the second Live Better . . . *Electrically* telecast. Frank Falge, LBE director in eight Western states, showed the film as part of his talk and set up an impressive exhibit of program aids and activity. F. W. Williams, American Gas Assn., spoke for the gas industry. A. Cameron Ball was master of ceremonies.

E. J. Sorenson, Hotpoint manager of special markets, Chicago, tries a cup of coffee made by Home Economist Clara Sherburne in the company's new percolator accessory on de luxe range. At right, in the J. J. Lukanish booth, E. J.

Vander Linden, Gibson divisional sales manager, shows the new Gibson refrigerator to F. M. Brittain of Household Furniture Co., Sacramento. J. J. Lukanish and Art Kuhnhausen, his Sacramento representative, look on

Maurice J. Carley, Kelvinator sales manager, Oakland, and Ed Skarr, Del Rey Appliance, Sunnyvale, look over Kelvinator's new line of room conditioners. At right Larry

Warmack, Wesco major appliance representative, demonstrates the new Westinghouse electronic oven. This appliance continues to be a big attraction at all showings

Jack Reed, left, shows how radioactive isotopes are used for medical diagnosis. Dan McNellis shows atomic generation

Stage Show Tells About Using Peaceful Atoms

Taking the scare out of the word "atom" is proving to be an interesting and rewarding activity for members of the Information & Publicity Department of Public Service Co. of Colorado. With a stage show called *The Fabulous Atom*, they are dramatizing the peacetime role of the atom for a wide variety of audiences.

Though the show has gained acceptance by many adult groups, its big success is in the schools. To measure how effective the show is in educating students on the utilization of the atom, a 15-question test of general knowledge on the subject was given seven Byers Junior High School classes in Denver before the show was presented. The students then saw the show. Immediately afterward, the same 15 questions were given the students and five of the seven groups showed a decided improvement in their knowledge on the subject. Public Service reports that the one case of no improvement and another of only slight improvement is attributed to the fact that the students were able to answer nearly all the questions in the first time through the test. Both groups were ninth graders.

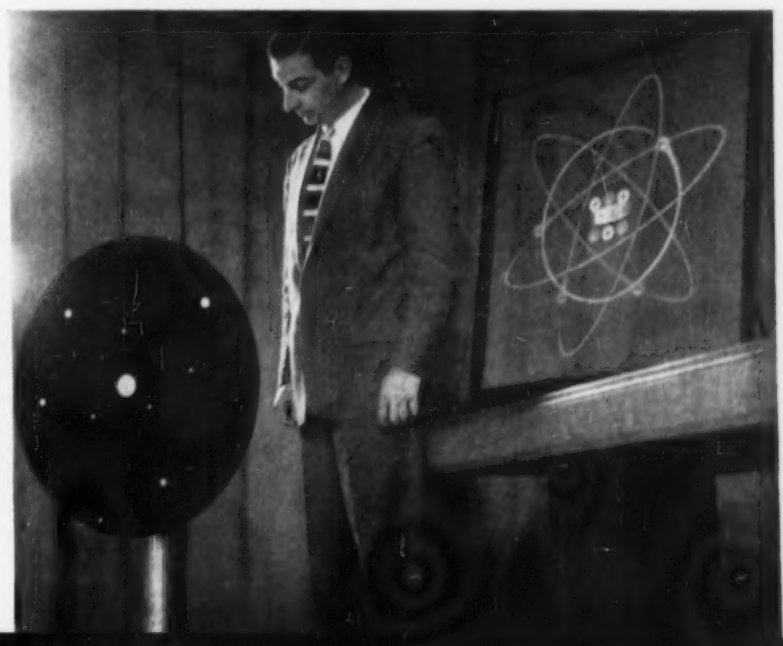
Purposes of the show are: (1) to assist in giving the public a better understanding of the atom; (2) to tell and demonstrate the promises atomic energy holds for the world; and (3) to inform the public that the electric industry, and specifically Public Service, in the true tradition of free enterprise, has an interest and a responsibility in the peacetime development of atomic energy.

The aims are accomplished with dynamic and colorful demonstrations (see photos), and with the narration which was written by Public Service employees. The entire show takes 45 minutes, and is liberally endowed with impressive graphic aids that help tell the story. Adult audiences are shown a higher age-level version than the student groups.

At the present time the show is making the rounds of public and parochial senior high schools in the Denver metropolitan area. It is planned that all of them will be reached in the current school term.

To the students, the show carries the message: ". . . . there is still much to do and much to learn, with too few really able, trained people to do it. Our atomic future is dependent upon young men and women . . . to meet this challenge of tomorrow."

John N. Kerr, director of information and publicity, and his assistants, Jack H. Reed and Dan McNellis, are in charge of the program's production and scheduling.



McNellis uses these devices, ultraviolet light and a stroboscopic lamp, to demonstrate construction of the atom

ELECTRICAL WEST

Tribute to Some Pioneers

WITHIN the past month death withdrew from among us several well loved old-timers who brought distinction to the West and to their industry. Coincidentally three were contemporary top men in the supply distribution field — Dave Salsbury and Dave Harris, and Rudy Holtermann, all vice-presidents of their competing companies at the time of their retirement. In the field of engineering and law another old-timer, Walter J. Walsh, was called.

Each in his own area contributed much to the infant industry in the West in the days when they had to carve new paths in distribution and supply, for there were no roads to follow. Indeed they have left roads as a result of their work over which the industry travels today.

Partnership Benefits

THE Secretary of the Interior's recommendation for partnership development of the Trinity River project in northern California is reassuring to all who believe in sound economics — nationally, locally and personally. Norman R. Sutherland, Pacific Gas and Electric Company's president, clearly summarized the monetary and other benefits of partnership development in his comments with regard to the Secretary's recommendations.

His remarks, although applying specifically to the Trinity project, so well illustrate how "partnership" policies work for the general welfare and common good that they are reproduced verbatim herewith.

"The Secretary's recommendation should have a far-reaching effect in encouraging more extensive development of California's water resources. The savings to the public under the company's cooperative arrangement, as Secretary Seaton said, would make funds available to assist further water conservation in this area.

"The company's participation in the development will result in a capital saving to the government of approximately $56 million. Over the 50-year project repayment period the total benefits of our proposal will approximate $310 million. This includes $165 million in additional net revenue to the federal government from falling water, $83 million in federal taxes and $62 million in tax revenue to the state and local governments.

"Our proposal follows a long-established pattern of similar PG and E cooperative arrangements with the federal government, cities, irrigation districts and other local agencies, and will further the development of the State Water Plan. Such joint developments have contributed materially to water conservation and irrigation in California for more than a quarter of a century.

"Under our proposal, Trinity power would be marketed without discrimination to all electric customers in the 46-county service territory of PG and E. It would be sold at rates fixed by the California Public Utilities Commission. Our offer represents the full market value of Trinity power, made firm by the extensive steam and hydro resources of our integrated system."

Promotion Pays

JUDGES of a recent contest built around the effects of hard-hitting promotional campaigns were impressed with the factual evidence in many of the entries of the really remarkable results that can be obtained under strong load-building efforts. In some cases the resulting unit sales of appliances, as measured by NEMA shipments into an area, were spectacular.

Nor did the existing saturation of appliances in an area appear to make much difference on the over-all results of a well-coordinated campaign. Companies having high appliance saturations resulting from previous loadbuilding efforts often did as well percentagewise as the companies with much lower saturations. It was also evident that the companies that took full advantage of the national

EDITORIAL VIEWS

impact of the industry-wide promotional campaigns such as Live Better—Electrically fared exceedingly well.

The performance of one of the winning companies, saleswise, exemplifies a precept that every utility executive might well bear in mind. This company, operating in an area where a large majority of its customers are in a relatively low income bracket, put on a well-coordinated promotional program that attained truly remarkable results, far exceeding some of its companion companies which operated in much lusher territories. The moral seems to be that our industry can get its fair share of the customers' spendable dollars, and more, if it goes out after it.

Skytop Laboratory

RESEARCH with a truly Western flavor is being carried out at an altitude of 10,000 ft near Leadville, Colo. There the Public Service Co. of Colorado, in a joint program with several electrical manufacturers, has established an outdoor laboratory that may provide many of the now unknown answers to questions about ultrahigh-voltage transmission at high altitudes. The program appears in more detail on page 94.

The spectacular electrical growth of the West inevitably will require the transmission of larger blocks of power between areas separated by high mountains. Little now is known about corona losses, the performance of bundled conductors under the severe winter conditions that are experienced at high altitudes and the mechanical loadings on large-capacity circuits under such conditions.

This high-altitude testing station is an exploration into a new frontier of electrical knowledge. Here again is evidence of the fine teamwork between electrical manufacturing firms and their customers that has characterized the progress of this industry throughout its entire growth and development. Joint ventures of this type, undertaken solely to prepare for the future and to provide useful data for all who may need them, have played no small part in making and building this great industry.

Engineers Need Help Too

IT'S interesting, with engineers in such short supply, to notice that computers still seem to be considered basically tools of the accounting department. In some companies, engineers get a little "machine time" at night or when an urgent program such as stock control is not in process.

Office machines, computers and technicians would seem to be able to multiply an engineer's productive capabilities in the same way that a turret lathe increases shop output. More important, machines can remove much of the slide-rule drudgery that has long been the lot of the young engineer. Freed of tedium, young men might be more inclined to view utility positions as opportunities to use their minds creatively.

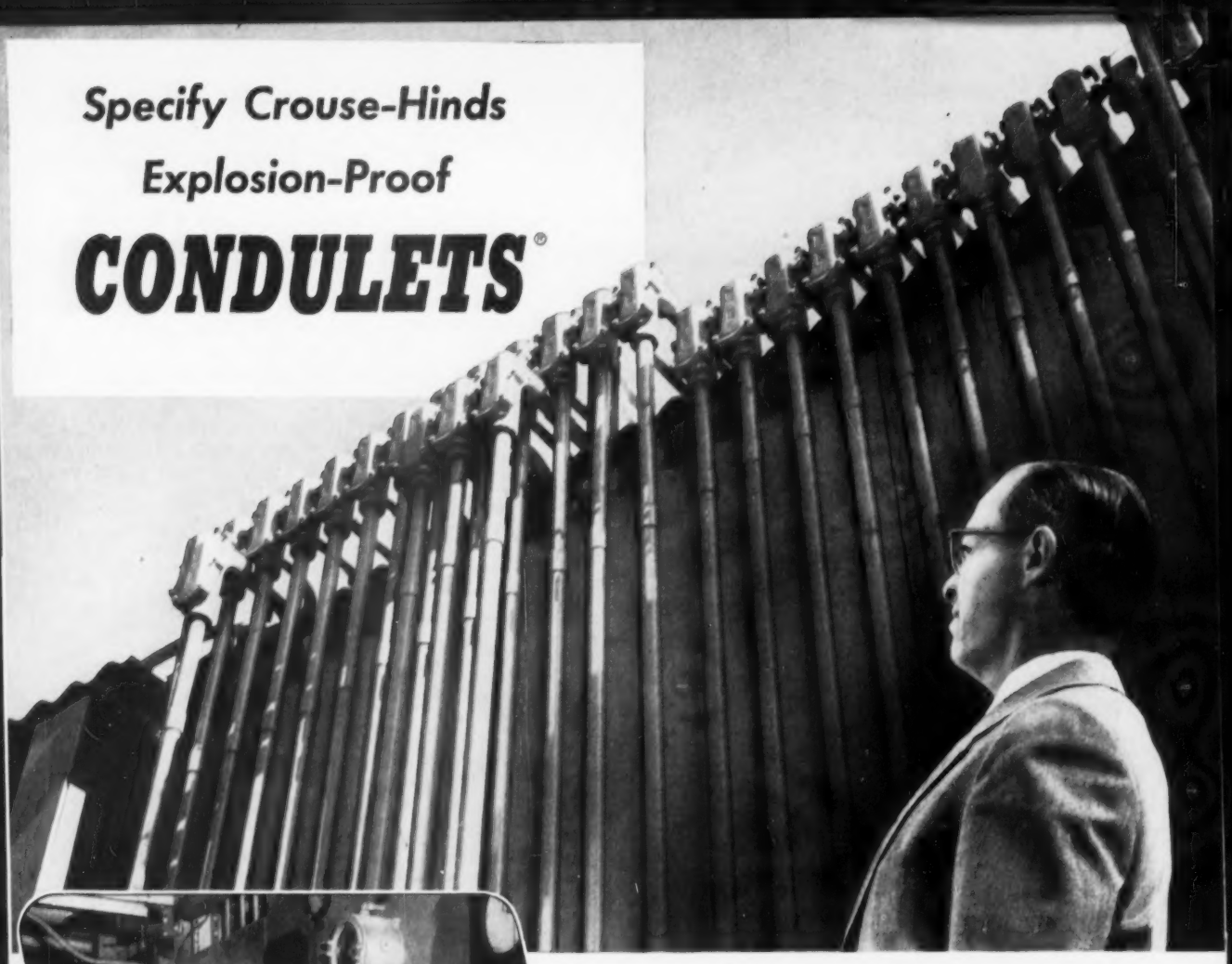
The accounting department usually justifies accounting machines on the basis of reduced clerical expense and better reporting for management. Would not more engineering per dollar and more accurate engineering appraisals gain like management approval?

Today's engineering graduates are armed with a rudimentary understanding of computers. Their laboratory calculations are often programmed as a computer study as well as an engineering analysis. It is possible that utilities are not utilizing this new basic engineering skill to full advantage.

Management has been sold that it pays to relieve the storekeeper from the drudgery of counting bolts, the accountant from the tediousness of calculating bills and the treasurer from personally signing all the pay roll checks. It should not be too hard to sell management that emancipating the engineer from laborious equation solving would pay off too.

Specify Crouse-Hinds Explosion-Proof

CONDULETS®



BE SAFE! Rely on Condulets for full protection against electrically-ignited explosion—in any area classified hazardous by The National Electrical Code.

You'll find Condulet Explosion-proof electrical equipment in the nation's leading plants – from complex instrument enclosures like those on the panelboard (at left), to simple pulling elbows on the branch circuits (above). You'll like Condulet equipment because it installs easily, works right, and stays on the job for years without attention.

There are more than 15,000 Condulet items: conduit fittings, plugs and receptacles, motor controls, lighting fixtures, switches, hundreds of others, both explosion-proof and conventional. Make your selections with confidence. You get the best when you get Condulets.

Our distributors have the facts. Or contact a Crouse-Hinds Office below:

A NATIONWIDE **DISTRIBUTION** exclusively through **ELECTRICAL DISTRIBUTORS**

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ELECTRICAL WEST

Contractors' News Letter

QUICK NEWS ON TRENDS, LAWS, CODES, MATERIALS, EQUIPMENT, COSTS, WAGES, ETC.

Consolation

"We sure have the highest wage rate," the man said. "But," said his pal, "You aren't working, so it doesn't mean anything." "Yeah, I know, but if I ever do work, why I'll have the highest darn wage you ever saw!"

Yellow signal

Something like this is going on in the home building and small commercial business these days. They seem to have bogged down in sticky credit and customer do-it-without. But demands for more pay and fringes continue unhearing. It'll take a heap of Live Better . . . Electrically to start much housepower in every house and home -- the hard way.

All but one

Just when there was accord for the first time throughout the entire San Francisco Bay area on a uniform rate and fringes, Oakland's Local 595 had to be different again. Although the package of increases agreed upon is high, the contractors gave it without a murmur for the sake of uniformity and peace. The package consists of a two-year agreement with the present $3.60 scale going to $3.85 on June 1, 1957; $4.125 on Dec. 1, 1957; and $4.25 next June 1, 1958, until June 1, 1959. It would include the 1% pension, vacation, health and welfare, and 5c an hour to a joint industry board, of which 1c would be for apprenticeship training. Oakland's demand is for a raise to $4 an hour and vacation increased to 6% from 4% and 10c health and welfare, on a one-year basis.

Wire sag

Copper was the only thing that seemed to be going down in price. Bare wire took a dip and price of building wire to distributors dropped about 10%. Before new prices could be calculated for contractors, some hungry wholesalers were offering more than that to bidders.

Sound advice

"The contractor will be confronted by many complex problems during the coming year," said Sid F. Hill, Hill Electric Co., Los Angeles, in a statement that came to us too late for a previous issue. "One problem will be the shortage of skilled workmen and the ever-increasing cost of labor and material, which seem inevitable. Another is the Federal Reserve policy of fighting inflation by clamping down on the supply of credit increase, the cost of borrowing for expansion, improvement and modernization. The profit margin will be curtailed because of the difficulty in passing these increased costs on to the consumer.

Better management

"Careful planning, flexibility and sound business principles must be adhered to, greater care in estimating and supervising your work and the employment of modern tools and labor-saving devices will have to be employed in order to meet stiffer competition that lies ahead," he said.

Three on a match

Almost like coincidence was the death, within a week, of three of the West's former top executives in the wholesale field, Dave Salsbury and Rudy Holtermann of WESCO and Dave Harris of G-E Supply. They had all been active in the same era and all retired and each had been a vice-president.

Distributors multiply

More electrical supplies distributors are entering new areas. General Electric Supply Co., which never before had a branch house in San Jose, opened a big new house at 735 Coleman St. A. Rohl Barnes is sales manager. Phil Paul is store manager. . . . Phillips & Edwards Electric of San Francisco has established a new branch house at 501 Howland St., Redwood City. . . . Merle Potter, formerly of Smoot-Holman, and Bill Stewart have opened a branch of Cal-State Electric Supply of North Hollywood at 45043 N. Yucca Ave., Lancaster. . . . Ronald D. Burris of Fresno is opening a new company, KESCO, Kings Electric Supply Co. Inc., at 195 S. 10th St., Hanford, on March 15.

Musical chairs

General Electric Supply in Los Angeles has its backfield in motion if L.A. Electric Club's Sparks is on to it. Verne Cooper, L.A. district manager, became regional manager in Nashville. Ken Rehwaldt, who had been North Pacific supply and apparatus district manager, Seattle, replaced him. Jim McMillen of Los Angeles became San Bernardino S&A sales manager and Ray Morgan from San Bernardino replaced Ken Moulton, who left the company. H. H. Bullock of L.A. went to Seattle as manager of user industrial sales for G-E and C. C. Holland of Phoenix replaced him in L.A.

Luminous promise

Electroluminescent panel lighting development is so promising that Westinghouse Lamp Division has set up a separate "Rayescent" organization both to continue research and to apply it to the new light source--a phosphor condenser sandwich that glows when energized. Since its discovery in 1936, the light output has been stepped up to match that of fluorescent lamps and much more is promised.

Really big time

Well, Electric Week this year was a little more up to the standard of its founder, Captain Stephen E. Sanislo of Seattle Fire Department. It really was impressed upon the public by nation-wide, even international celebration. For years Sanislo's voice, and it is quite a siren voice, was heard only in the wilderness. He was honored as the speaker at Oregon Electric Club's Feb. 14 meeting, when NECA's Larry Rodgers, IAEI's Cliff Atkins were in charge.

Rubber to aluminum

Look for your U. S. Rubber Wire and Cable friends now at Kaiser Aluminum & Sales. For U. S. Rubber sold its wire and cable business to Kaiser, which took over the personnel. Leon Guibara and Art Gingell now make office over at Oakland Kaiser headquarters.

Teach to figure

Leo Allen of Barker-Allen Electric, Hollywood, graduated the 10th estimating class, 25 with perfect attendance record, in February and the 11th class which he conducts for the contractors division of Los Angeles Electric League and Los Angeles schools adult education division has started.

Make it a profession

The Construction Industry School of Estimating Inc., a new private enterprise in Los Angeles, has launched a school for take-off men and estimators at 3356 Glendale Blvd. The first class, with a $235 tuition, started Feb. 11. It is a professional course, running 16 weeks, with two three-hour sessions per week. It was founded by William Heidorn and Charles H. Hays.

Moves

Some moves announced--Sangamo Electric moved its Los Angeles office to 1819 W. 6th St. . . . Hugh Sheeter, manufacturers' representative for Howard Duct has moved to 3356 Glendale Blvd., Los Angeles. . . . Southern California and Los Angeles Chapter of NECA has moved back to 2408 S. Broadway in its own new building erected on the site of its old "residence."

Licenses contested

A case that may invalidate city license fees for electrical contractors in California is causing concern among cities until a Supreme Court ruling can be had. In case of Agnew vs. Culver City, the court held that since Agnew held a state contractor's license the city had no right to require a city license. The city maintains that its license is for tax revenue only and is not regulatory. Meanwhile contractors are being advised to pay their licenses with a protest note on the back of their checks reserving the right to sue for its recovery.

Grind out laws

Legislative mills are grinding away in most Western states and several have bills that will affect electrical contractors. . . . In Montana a bill to permit electrical inspections in suburbs to cities passed the senate. . . . Wyoming legislature had before it a bill to create a state electrical board to license contractors and electricians. No word here whether inspection is included.

Conflict in bills

Utah's legislature had some conflicting and overlapping bills to consider. HB 113 provides for examining, licensing and bonding of all contractors. SB 63, the inspection bill with contractor and electrician licensing, was reported out of committee. SB 76, to eliminate contractors' licensing, was going through committees. SB 157 to place lay members on engineering examining boards was put on the calendar. The others still had sifting to go through.

Variety spicy

California's were more numerous among 7,000 bills entered. Bonding of subcontractors, prohibition of misleading ads claiming to be contractors, bankruptcy suspension of license, heirs to a license, vehicle identification for all contractors were among the most significant. Ernest Kramm of Northern California NECA is the representative on the Construction Industry Legislative Council watching them.

Protests new federal bill

Meeting at NECA President Oliver Burnett's home in Scottsdale, Ariz., late in January the NECA executive committee approved the new Federal Construction Contract Procedures Act introduced in Congress to succeed the bill that almost passed last Congress. A five-day-wait clause may provide a loophole for bid peddling but will brand it as such. The bill will declare such practice illegal. No. Calif. Chapter directors protest the preamble nullifying separate electrical bids; also 5-day clause.

Prize CL winners

Prize contest for Certified Lighting jobs, which the Northern California Electrical Bureau ran, ended Jan. 31 and prizes awarded in February. There were 82 entries from 44 contractors. In a point system emphasis was given to getting commitments of pending jobs and completing them. Emil J. Weber Co., San Francisco, won first prize of $175; Thompson Electric Co. of Walnut Creek second of $100; Jones Electric of Hayward third of $50; and United Lighted Ceiling of Oakland fourth of $25.

Show buyers the light

All visitors to the lighting clinic staged by Northern California Electrical Bureau and PG and E and tied in with the Certified Lighting program were given a complete list of electrical contractors in northern California who had taken the course. Visitors were buyers and store owners to the men's and women's apparel markets at the Sheraton-Palace Hotel in January. A similar clinic for the furniture, appliance and giftware buyers at Western Merchandise Mart, Feb. 4-9, drew similar interest. Registration cards signed will be given Certified Lighting graduates as prospect leads for follow-up.

Arizona housepower

Northern Arizona Adequate Wiring Bureau was started by 15 contractors, distributors and Arizona Public Service and C. F. Raudebaugh, Flagstaff electrical inspector. George Hill, APS division sales manager, is chairman and Ed Krazel is secretary.

Advertise the customer

Another Certified Lighting Bureau is in full momentum in Sacramento, organized by the Sacramento Valley Electric League and Sacramento Municipal Utility District. One training session was held before Thanksgiving for 35 enrollees of which 27 graduated--6 utility, 4 manufacturer representatives, 2 distributors and 15 contractors. The bureau cooperates with the San Diego and Northern California bureaus in magazine advertising and locally runs a 10x40-in. ad in local papers when a customer relights and adds 10 kw of load, publicizing his new lighting job.

Another departs

Charlie Vorlander, 75, founder of Reliable Elevator Works, one of Sacramento's oldest electrical firms, died Feb. 3. He started his company 40 years ago after earlier work for PG and E as trouble shooter in horse-and-buggy days.

Islands bureau

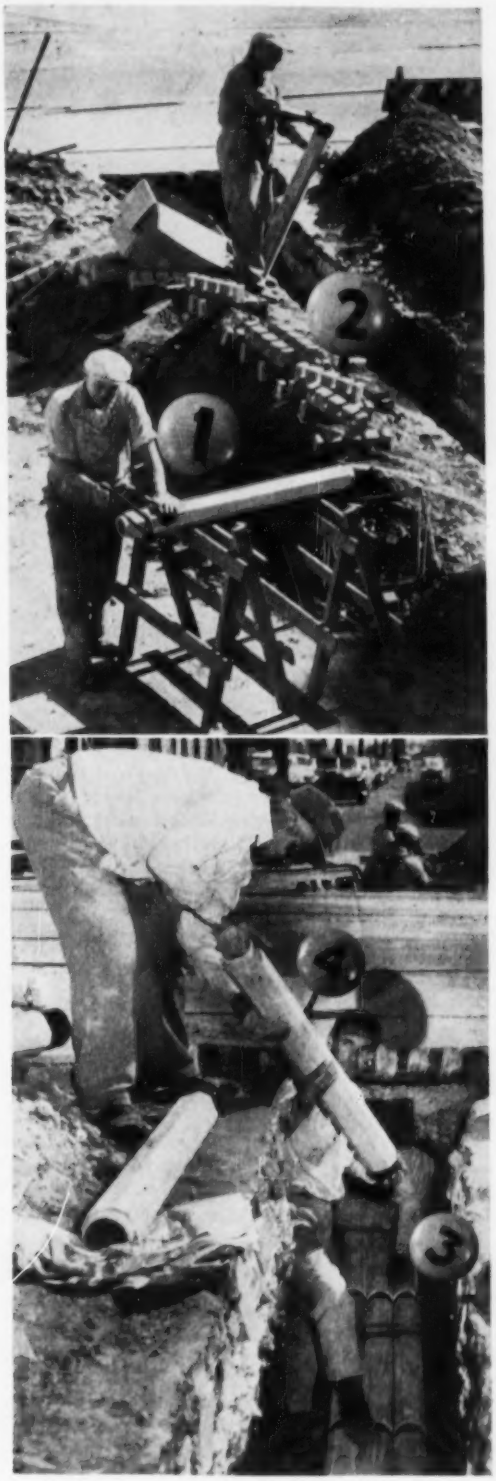
A Certified Home Wiring Committee has been set up for the Hawaiian Islands by the Pacific Coast Electrical Assn. in cooperation with the Electrical Contractors Assn. Its chairman is Charles McAllister, Hawaiian Electric commercial department. Other board members are: Virgil Nahl, Robert Plaus of American Factors, James Chock of Lewers & Cooke, George Morishige, past president of the Electrical Contractors Assn., Colin Murdock of Maui Electric, C. T. Thrumston of Hilo Electric and W. A. McCoy of Kauai Electric. Standards call for 100-amp. service.

Heard this?

Among people this news--Allen Fischbach, who has been with the Los Angeles office of Fischbach & Moore, has been made executive vice-president and returned to New York. . . . Robert J. Wolf has been appointed division manager of Kaiser Engineers, Oakland. . . . Charles H. Holland, retired Sacramento electrical inspector, now apprentice coordinator for NECA, was severely injured in a train-auto crash near Folsom but is reported recovering. . . . John R. Ford was appointed Seattle branch manager of Westinghouse Elevator Division replacing Russell Hurt, who was promoted and moved to Jersey City. . . . Ray Waggoner has been made executive vice-president of Hubbard & Co. and leaves Emeryville for Pittsburgh. . . . Eldon Harris is the new commercial and industrial lighting specialist for Sacramento Municipal Utility District. . . . W. R. McCabe, who came to Portland two years ago to head Lord Electric Co.'s new Western office, was made vice-president of the big electrical contracting firm. . . . Syd Meyerson now heads a new lighting laboratory in Ruby Lighting Corp.'s new plant, Los Angeles. . . . Ed Muller was given a handsome set of luggage upon his resignation as secretary of the Southern California Chapter, IAEI.

Active division

Contractors' Division of the Bureau of Home Appliances of San Diego County is again sponsoring exhibits of wiring materials, home lighting and heating to fill one exhibit building during the Spring Fair of Modern Home Ideas in Balboa Park April 23 through 28. . . A summary of the past year's activities of this division notes three dinner meetings with total attendance of 540 and 20 other meetings with 140 attendance. Certified Lighting courses put on by the bureau, three in number, totaled 81 persons.



Subsidence danger dictated the use of reinforced encasement for this new P.T.&T. duct course below four old street surfaces and under Southern Pacific's tracks in San Francisco.

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MAYDWELL & HARTZELL, INC.
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2 **SIMPLE PRE-CAST BASE BLOCKS**
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3 **SIMPLE CIRCULAR COUPLINGS**
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SOAPSTONE DUCT COMPANY

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Oakland 8, California

Light from outside—by day through dome skylights; by night from reflector floods in weatherproof units mounted on the roof to beam light through the skylights to the room area below, controlled inside by rheostats or low-voltage relays

How Wire the Steel X-100 House?

How would you wire an all-steel experimental house having no walls or furred ceiling? How would you light it? How feed power to its multitude of new electrical equipments?

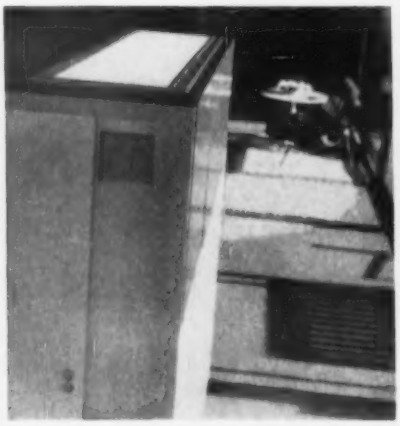
This was the problem put to Jones Electric Co. of Hayward and Sunnyvale by Eichler Homes and the architects, A. Quincy Jones and Frederick E. Emmons, when the X-100 experimental research house was built in The Highlands tract above San Mateo on the Skyline. The steel frame, steel roof, a free-standing pavilion with outside walls of Formica panels or floor-to-ceiling glass, with cabinets for partitions inside, attracted nation-wide attention when put on exhibit last October. But how was such a house wired? There was no space in walls or ceiling to conceal it.

To Russ Rollins, young engineer and superintendent for Jones, fell the task of devising ways to do it. The pictures show some of the equipment selected or, in the case of lighting fixtures, designed and made to fit the decor. Like the house itself it is all-metal.

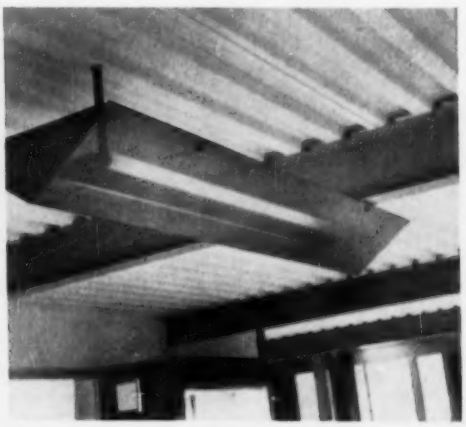
Service is brought underground from the street pole to an outdoor panel and meter on the back of the car port workshop. It is a 220-v service of 200-amp capacity. From there conduit runs underground to a large special circuit breaker load center in a hallway. From there conduit is taken up through the roof deck to a weatherproof junction box from which conduit runs radiate across the roof to required locations. These junction boxes are low and eliminate the need for an elbow or bend. Where the conduit runs with the indentations of the steel roof deck it is run in the bottom of the channel. Where conduit runs at

Table in kitchen area slides open where two range units are provided to cook at table or keep food warm. Limit switch under table cuts current when top closed

Appliance cabinet at end of table for storing appliances has lighting unit in top to light ceiling and reflect below. Low-voltage switches are in the cabinet



Additional light over table is provided by perforated black metal V-shaped fixture with fluorescent lamp, switched by relay from the appliance cabinet facing



Plugmold along outer wall is fed from conduit stubbed up through from outside

Load center for entire house was placed in shallow cabinet especially designed

Outlets like this are located throughout the indoor and outdoor gardens

right angles the Fiberglas roof insulation is butted against the conduit and the roof finish conceals it. To feed the Plugmold strips along the outside walls conduit runs underground from the load center panel and stubs up outside and through the Formica wall to the molding.

Only around the center core housing the bath and utility room is there wall space to conceal plumbing and wiring. All other points of use had to be fed and switched by some ingenious means, either over the roof or underground. Novel features are a number of interior garden spaces. To light these, either the swivel units mounted on the trolley duct or newly designed units on pipe stems in the garden space itself were devised. To reduce glare showcase reflector mirrored tubular incandescent lamps were used inside perforated metal shields. Numerous weatherproof outdoor receptacles are located in both the indoor and outdoor garden areas from which to plug in portable garden lighting units.

Among the many electrical features are the built-in range, double ovens and surface units, both under the wall cabinets and in the middle of the dining table in the kitchen. Half the table top rolls aside to expose two range top units. A limit switch underneath cuts off the electricity to the units when the table top is closed. The home has a built-in refrigerator-freezer, Thermador's first of a new line recently introduced. It has a new Waste King dishwasher with a black Micarta front, and a disposal. Bedroom glass doors are motor operated with controls at the bed and the door frame. A G-E combination washer-dryer is in the utility room; a Shopsmith in the workshop.

Living room area lighted by skylight with PAR lamps above. Rheostat controls and special decorative fixtures on wall of central core; also intercom speaker. Decorative lamps are black perforated metal tubes, left

Trolley duct behind the I-beams along each side is used to suspend units of any kind to light areas as wanted

Perforated metal shielded lamp in steel roof deck over porch. Ballast is fed through roof deck by conduit

Two more stories may be added to the building in the future. Solid side panel on light units baffle lamp brightness

Idaho State Building Can Grow

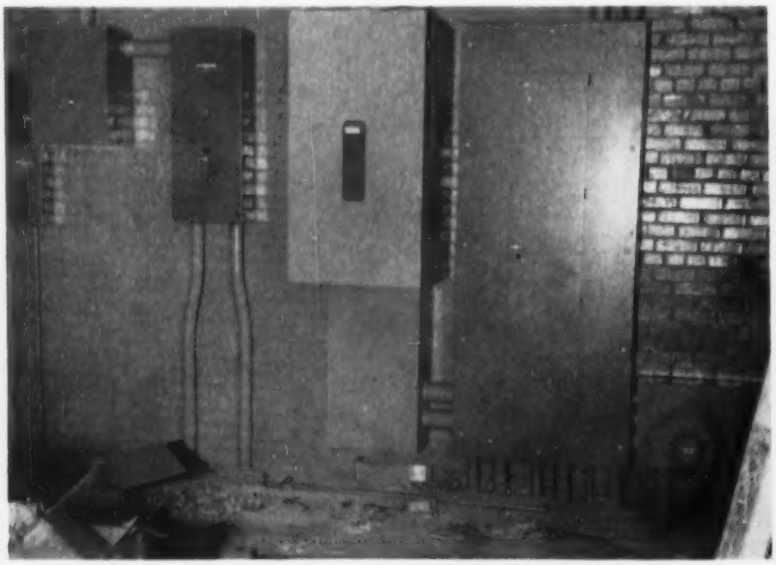
If most building wiring systems are outgrown almost from the opening of the building, the new Industrial Administration Building for the State of Idaho, in Boise, is the exception. Because the presently completed two stories and occupied basement are designed by Hummel, Hummel & Jones, architect, to have two more stories added later, Terance O'Rourk, consulting electrical engineer, doubled the raceway capacity and distribution system to more than take care of growth.

Simplicity of the electrical plan, making use of the cellular steel floor for both telephone and electric outlet circuits, despite the doubling of the feeder conduits for risers, enabled Electric Service Co., the contractor, to wire the 60,000-sq-ft building for $64,860 bid price, including air conditioning and electric kitchen but not the Q-floor. Space is ample in every panel also to double capacity.

All lighting is on 120/208, four-wire, three-phase; all power for motors above 1 hp is 480 v, delivered by Idaho Power Co. from two transformer banks and metered at the primary. The main power circuit breaker is 400 amp but space is left for replacement with a 600 amp when the other two floors are added. The lighting main breaker is 800 amp. A spare 3-in. conduit parallels every run to every panel and every panel is oversize to accommodate double the number of circuit breakers for future additions. The three runs of vertical feeders are arranged so that vertical extentions of the existing conduits can be made to the two new floors as needed in the future.

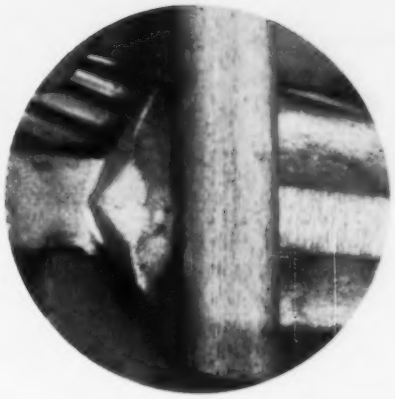
The panels take care of both the ceiling lighting and the underfloor outlet circuits, the lighting section being at the top of the panel, the floor circuits in the bottom. Main feeder breakers are all 200 amp and space in the basement main panel is provided for needed additions.

Floor area is arranged on 4-ft modules. Cellular floor headers for both telephones and power run the length of the building, with junction units on 18-in. centers. Lighting units above either are 4 or 8 ft, two-lamp fixtures mounted flush on the acoustical ceiling spaced to the floor modular pattern. Because of 9-ft ceilings, the side panels were left solid to shield the lamps from the viewing angle.



Double conduits from main panels provide raceway for serving future two floors

Arrows point to spare conduit, floor duct



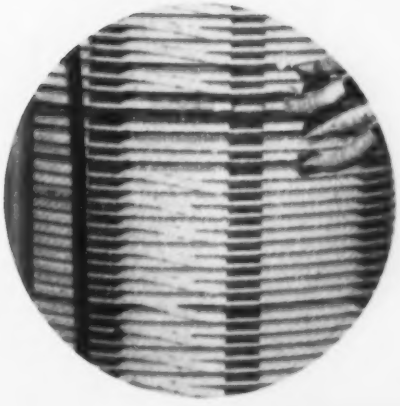
1. This maintains configuration and provides inhibitor protection!

Ans.—Cover-all spacer, an integral part of Anderson's U-Bolt Connectors.

do you know what this is ?

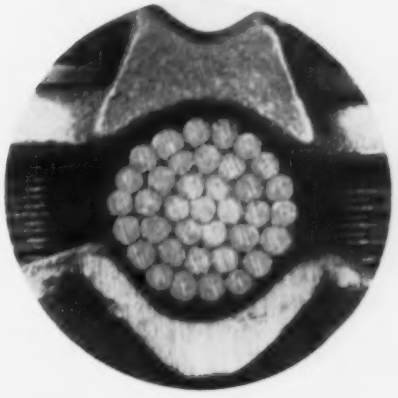
2. This breaks the current!

Ans.—A look inside the interrupter tube.



3. This carries the load!

Ans.—Coil assembly of oil immersed transformer.



4. Versatile application and increased range is its function!

Ans.—Exclusive Anderson Electric Vers-A-Groove.

This is number one in a series of quizes designed to provide constructive diversion and to sharpen your wits.

What is your score?

ANDERSON ELECTRIC CORPORATION
Birmingham 1, Alabama

With wage rates going up contractors should

Face the Facts of Life

A. R. Woolley*
Manager, Utah-Idaho Chapter, NECA

Just why a contractor cannot absorb increased wage rates as he is told to do sometimes by the union negotiators may not be understood even by many contractors. Certainly they are not charging for labor what it costs them, to say nothing of making a profit on it. Fearing competition from their fellow contractors who are not charging it either and driven down by customers who protest it fearing to lose their business, many contractors are shutting their eyes to the economic facts of life and hoping the roof won't fall in.

It may appear to his men, his customers and even to a contractor himself that when he pays $3 an hour for union labor and sells it for $5 he is making plenty of profit—but is he? What does it cost him to hire and work that journeyman? First in pay roll taxes and insurance—

Pay Roll Taxes and Insurance

Social security tax	2.25%
State unemployment (this varies)	2.7
Federal excise	.3
Workman's compensation	2.25
Public liability and property damage	.10
NBB pension fund	1.00
	8.60%
NECA dues based on pay roll	1.5 %
	10.10%

If anything, this is on the conservative side. Many feel it costs 11% nowadays.

To put that man to work the employer has to have a truck, tools and equipment; has to give supervision and management and he should cover other overhead and profit. By conservative estimates these run to about $2 an hour broken down as follows:

Truck	$ .65
Tools and equipment	.15
Supervision and management	1.00
Overhead and profit	.20
	$2.00

If the truck cost per hour seems high, consider these costs:

Interest on investment	$105
Depreciation of truck	440
Insurance	130
Gasoline	360
Oil	43
Tires	96
Repairs	150
Taxes, licenses	20
1-ton truck, year's total	$1,344

Used 2,000 man-hours ($1,344 ÷ 2,000 man-hours = $ .672 per straight-time hour).

Apply these to the base pay roll rate, at $3 an hour (similar percentages would apply to higher wage scales) and it begins to add up:

Labor rate per hour	$3.00
Taxes and insurance 10%	.30
Pay roll bookkeeping	.18
Occupancy	.12
Adjustments and bad debts	.14
Conservative total	$3.74
Truck, tools, management, other overhead and profit	2.00
What should be charged	$5.75

Instead of that, however, many hesitate to charge $4.50 an hour for a $3.00 basic wage rate. It is the same with higher rates. Yet look what we used to do in 1945 when the wage rate was $1.50 an hour.

*From a talk to contractor groups.

We sold it for	$2.50
Rate was	1.50
Margin (not profit) was	$1.00

A $1 margin divided by a $1.50 rate made a 66 2/3% margin.

Today, selling at $4.50 for a $3 rate leaves a $1.50 margin, which is only a 50% mark up. The difference between a 66 2/3% and a 50% markup is a loss of 16 2/3%. Such a loss amounts to 25% of a 66 2/3% markup, so a quarter of the contractor's markup is gone.

But the things he buys but does not sell cost him twice as much.

A contractor may kid himself that some of the items are high in the estimates of occupancy, pay roll bookkeeping and management and bad debts. But think about them a minute.

Occupancy figured above only allows about $900 a year from labor sales to pay for rent, light, heat, telephone and all other occupancy expenses that he has for the benefit of his employees and from which to get them work to do.

The pay roll bookkeeping and reports figure only allows $600 a year of the salary of office employee who does it. The balance must come from the margins derived from the material sales.

The man who owns the shop and employs the men, doing no work with the tools himself but doing all of his own estimating, ordering,

The Things We Buy but Do Not Sell Cost Us Twice as Much Today—

The Item	Then	Now
Gasoline—once cost about 19c a gal		.35
Oil—25c a qt		.55
Repairs—the job that used to cost $35 now is		$100.00
Tools—that you could buy for $10		18.00
Tape, that you give away on the job, $5 worth now costs		12.00
Step ladders—used to cost 50c a ft now it is		1.25
Insurance—$1 worth now comes to		1.50
Taxes—what once came to $100 now is		150.00
Labor, nonproductive,—$1 worth now costs		2.00
Trucks—a half-ton truck that cost $1,200 now is		2200.00
Occupancy—what cost $1 now demands		1.75
Office equipment too—$1 doesn't buy it. Takes		1.60

And yet you have one-fourth less dollars with which to pay these.
Profit is impossible unless your selling price includes it.

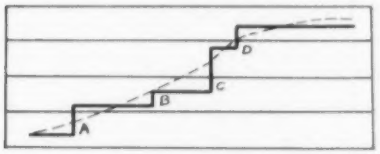
stock handling, contacting of customers, bookkeeping, financing, collecting, supervision, managing and janitor work will do well to get the same income that he pays his journeyman from that $1 per hour.

As for bad debts, this estimate is based on experience. It will require exceptional attention to business to keep it as low as that. One sour job could cost more than this percentage would make up in a year.

The profit item is little enough to compensate for the risks the owner assumes, plus the investment he has to carry. He would only make as good a wage for it as he paid his journeyman.

The average small contractor's average investment in inventory, truck, tools, equipment, furniture and fixtures is around $18,750. He has the highest ratio of investment to sales and/or labor costs of the entire industry. In many cases it is interesting to note that a contractor must invest an amount almost equal to the journeyman's wages for a year to put that journeyman to work.

As a contractor's volume increases his investment increases. His volume increases gradually but his investment increases in sudden jumps. It looks something like the graph below, where the curved line represents volume and the heavy straight line represents investment and fixed costs of doing business.



A contractor with this picture would have been better off had he been able to stay at point A or C. Certainly his investment at point D is not proving wise because he is now in a desperate struggle to break even.

It is tempting to go after "the big work" but it may not be very wise or profitable. It would be far better in many cases to give the small jobs better supervision and sell them at a price that is what they are worth —making sure that they are worth the price the customer pays so that he will be satisfied to pay it.

The customer is being asked to pay for high class, high priced skilled labor. Without strict supervision and good management of the materials to the job it will not be worth buying to the customer. Running a profitable business means management and selling the right price.

Built-ins — Are They Ranges or "Fixed Appliances"?

Inspector opinions differ on a hot subject

Sometimes they are called split tops. Sometimes built-ins. But whatever the separate oven and cooking top units are called the question of how they shall be wired calls for more argument. And inspectors have a way of writing what they themselves like into local ordinances rather than "let the Code decide," as the slogan of their association says. Because of these differences of opinion contractors making installations have to change methods from town to town.

In almost every chapter meeting of IAEI and of the sister organization in Canada, the Electrical Inspectors Assn. of British Columbia, the question is argued. Evidently the National Electrical Code panel is seeking more information, for chapter secretaries have received a questionnaire from Joe Gray, Portland chief inspector, asking inspectors' views. Many inspectors claim that the present NECode does not cover the subject in enough detail although installations are being made in accordance with its rules for ranges.

Main contention seems to be that the code permits both oven and the separate top to be installed on one 50-amp circuit. Many inspectors want these separate units treated as separate fixed appliances instead. This would require separate circuits to each unit, separately fused and wired in rigidly rather than permitting connection to a range type of receptacle. The question of grounding to the neutral also arises. The code permits it for ranges and dryers.

A committee of the Northern California Chapter, IAEI, appointed to bring in a recommended procedure for uniformity in the area it covers made the following recommendations:

"Each cooking unit must have a separate circuit with conductors and overcurrent protection of the proper size.

"Each unit must be directly connected with rigid conduit, EMT or approved flexible metal conduit.

"Independent equipment grounds shall be installed to each appliance. Neutral conductors shall not be used for equipment ground.

"In one or two-family dwellings panels may be installed in the meter box.

"In multifamily dwellings (more than two apartments) the panel shall be within the apartment in which the appliance is installed.

"In locations where the ordinance permits, nonmetallic cable may be used to connect self-contained ranges and dryers in old buildings. Neutral wire may be used as ground.

"Table 29 may be used to figure demand factor on over-all appliance load."

In floor discussion that followed its presentation, Harry F. Moore submitted an alternate proposal that he said would cover the same idea in fewer words. The main question, he declared, is to determine whether the separate units are a range. With that settled the code can take care of the problem under existing rules. His proposal—

"Built-in cooking appliances shall not be considered as electric ranges.

"Built-in cooking appliances consisting of individual sections or units shall be considered as separate units and shall have individual circuit protection for each such unit or section.

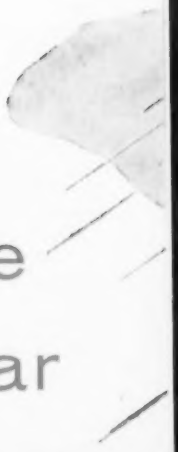
"Built-in cooking appliances shall be effectively grounded in accordance with Article 250 and in addition shall conform to Article 422."

In a dissenting opinion Horace Lee of Oakland maintained that separate circuits would permit smaller wire sizes, such as No. 8 and 10. He felt that by permitting both the oven and range top on a No. 6 circuit more flexibility was provided for future expansion or addition in wattage of the units. The city of Oakland has been permitting such installation and has had no adverse experience from it.

The code, by permitting either, merely remains what it is meant to be, concerned with the *safety* of the installation and the choice is up to the customer as to the desirability of either method.

Here's how to save on a rainy day . . .

Work INDOORS on new Westinghouse OUTDOOR switchgear



The weather need no longer disrupt your maintenance schedules. In fact, you can *use* the rainy or snowy days to work on new Westinghouse Shelterfor-M* metalclad switchgear—and save the more pleasant days for regular exposed-to-conditions jobs.

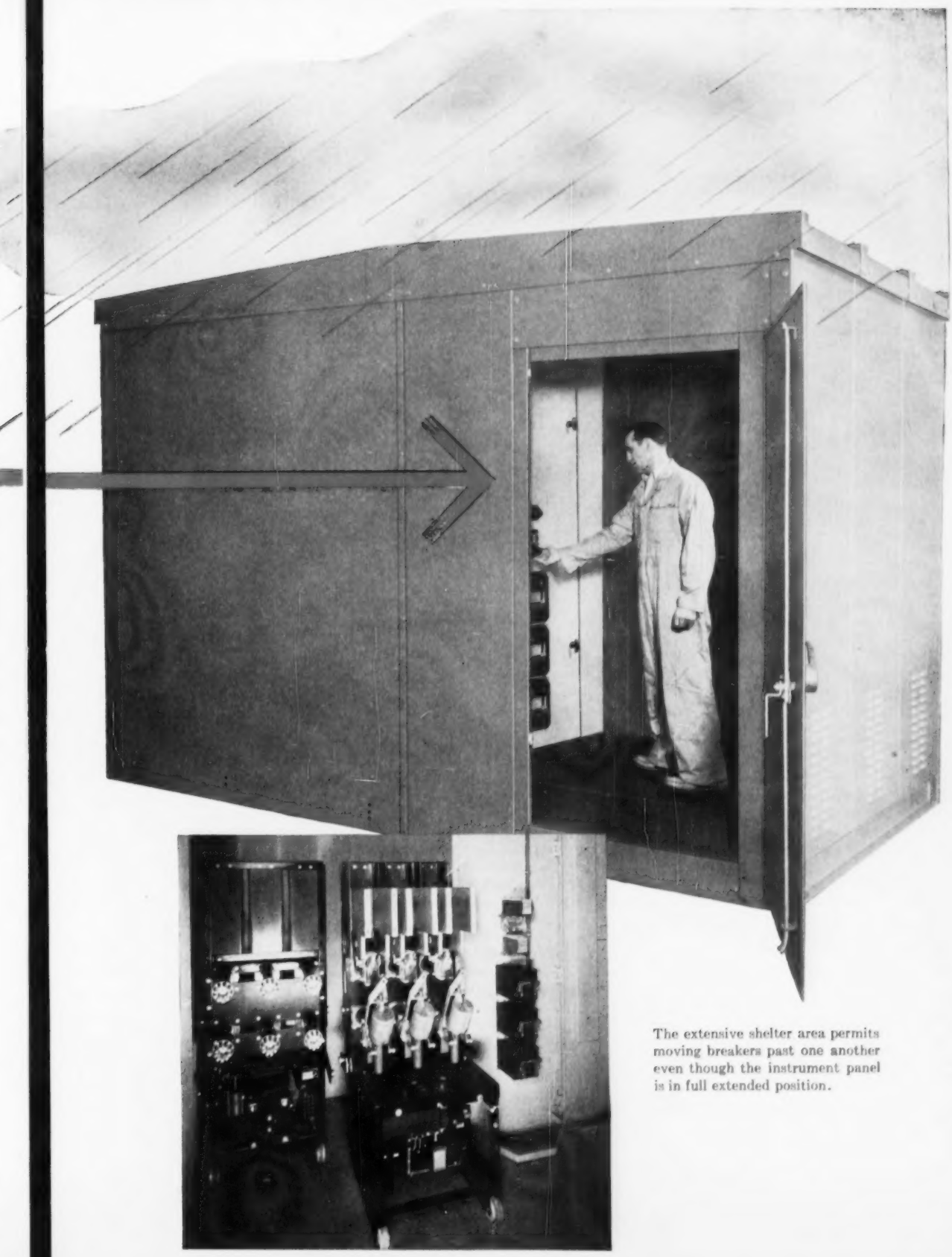
Westinghouse Shelterfor-M metalclad switchgear eliminates for all time the danger of rain or snow damaging breakers, instruments or relays. No more hanging canvas tarps—constructing makeshift shelters. Everything can be done from inside. Heating can be provided to eliminate the difficulty of working on super-chilled bare metal. In short, service is safe and comfortable in all weather conditions.

This new construction allows instrument panels to swing wide enough for front drawout of breakers for inspection and testing. There is room enough to pass two breakers side-by-side in the shelter even with the doors open wide.

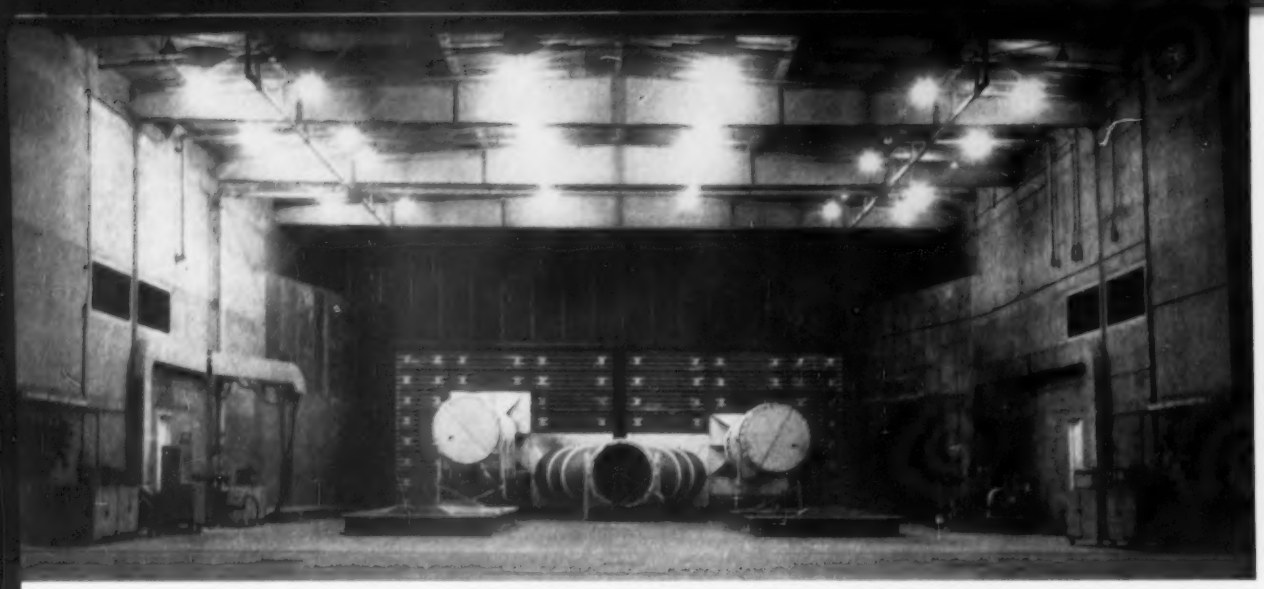
In addition, you get the other outstanding Westinghouse features such as . . . jig-welded construction, assuring interchangeability of like-rated breakers. Bonderized and multi-coat painting plus undercoating to eliminate rust and corrosion. Exclusive Redarta® insulation—the flame-retardant insulating material. Ask your Westinghouse sales representative for detailed information and prices, or write to Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa. J-60910

*Shelterfor-M—sheltered for maintenance

YOU CAN BE SURE...IF IT'S Westinghouse



The extensive shelter area permits moving breakers past one another even though the instrument panel is in full extended position.



Maintaining lamps for high intensity lighting needed for setup and observation of jet engine tests was rough but . . .

Mercury Lamps Solve Vibration

W. L. Davis

Electrical Supervisor, Plant Engineering
Douglas Aircraft El Segundo Division

The substitution of mercury-vapor lamps for incandescent types not only cuts costs, but it solved a constant maintenance problem due to vibration and delivered more light to working areas in a jet engine testing building at Douglas El Segundo Division.

The closed interior of a jet engine room presents problems peculiar to no other operation. During setup of an engine on a test stand, light of a high order must be available at the work level. Fuel and other lines, as well as electric cables and testing lines, are meticulously attached to the engine and then lead to the control room to recording and remote control equipment.

During this preparation period, when the engine is static, the problems of lighting are no different from any manufacturing operation except that there must be plenty of it. It is when the test cell is evacuated of all human occupancy and the engine is fired that an air turbulence and high-frequency vibration make the test cell an inferno.

Lights are necessary for observation from within control booths during the testing cycle—even though all necessary data are being recorded. The lighting facilities for all setup, teardown and observation work must remain in there and take whatever comes and function properly.

During engine running, the entire installation is subjected to high-frequency vibrations. Turbulent air will flutter any part or fixture that projects below the structural members of the 3,600-sq-ft room whose height is about 36 ft. Every high object must be secure because falling objects could be sucked into the engine intakes and that could entail a disastrous explosion that could physically endanger personnel as well as tear up costly equipment.

The original specifications envisaged incandescent 500-w vaporproof fixtures suspended from standard boxes on the ceiling with fixture hooks. This was done to provide flexibility and shock isolation between the fixture and the building structure for it was known that the building structure would vibrate at a greater amplitude than the fixtures, but also at a lower frequency.

The lamp life experienced was very short and this regardless of the type or make of incandescent lamps used. A constant maintenance replacement problem was presented and because of the isolation of the engine run-up building, a most inconvenient one. There are no built-in maintenance aides for changing lamps such as catwalks, cranes or Thompson hangers.

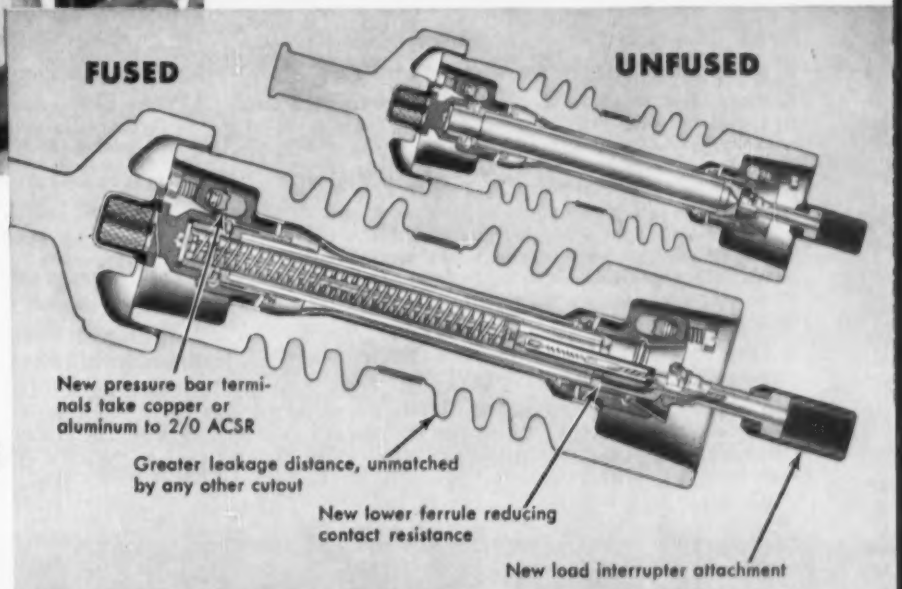
The main source of failure was the filament of the incandescent lamps and this occurred whether the fixture mounting method was rigid or flexible. This led to the suspicion that high-frequency vibrations were the culprits. These guide posts pointed to a lamp without filaments and the mercury-vapor type seemed worthy of test. The mercury-vapor light-producing element is a quartz arc tube that is supported in the center of the outer glass envelope.

A trial installation of four mercury-vapor color-corrected reflector-type lamps were rigidly attached to the structure in the hope that in spite of the greater amplitude of the structure it would move at a lower frequency. The trial gave such promise that a complete change-over to mercury-vapor-type was arranged.

The mercury-vapor lamps require a few moments to begin producing light. Thus when lights are first turned on, or when power is interrupted, or dip-in voltage occurs, a supplemental source is desirable. Such provision was made using 10 incandescent very-rough-duty lamps with 20 mercury-vapor lamps for the main light source. This combination delivers 55 f-c at the work level. (The 54 incandescent lamps in the original installation delivered but 32 f-c at the same work level.)

Two failures of mercury-vapor lamps have occurred in more than 2,000 hours of operation and approximately 225 hours of that operation were during engine run time. This performance to date indicates approximately 15 times the lamp life of the original equipment. The testing personnel are well pleased with their uniform, good color quality, and the higher level of this more reliable lighting system. Maintenance labor costs have been less.

. . . a new S&C Positect CUTOUT


FUSED
UNFUSED
New pressure bar terminals take copper or aluminum to 2/0 ACSR
Greater leakage distance, unmatched by any other cutout
New lower ferrule reducing contact resistance
New load interrupter attachment

The fused 100 ampere Positect can interrupt as much as 16,000 amperes, and can switch any steady overload it may be carrying—as much as 200 amperes with a 100 ampere link. Using a disconnect tube (upper picture) converts the Positect into an enclosed load interrupter with full 300 ampere capacity, both continuous and switching.

the only enclosed cutout for switching . . . now with load interrupting ratings to 300 amperes unfused . . . 200 amperes fused

By means of a new load interrupter attachment, the S&C Positect now provides full load switching. This new capability is designed to take care of the heavier loads on today's feeders.

The S&C Positect is the only enclosed cutout for load switching. Moreover, its action is positive. There is no external arc—no exposed hot parts. No links are broken.

Load switching capability is not the only "plus" for the Positect. For short circuit protection it's tops, too, besides having unique safety features for the lineman:

1. It is designed and tested for closing against a fault —"make" as well as "break."
2. Blast is directed away from the operator, so he is out of reach of the arc, flame and "shrapnel" in case he closes on a fault.
3. Kickback is prevented by high inertia of the fuse tube as it is driven home, directly opposing the recoil forces.
4. Blast is minimized by arc shortening and freer venting.

Specialists in High-Voltage Circuit Interruption since 1910

S&C ELECTRIC COMPANY

4425 RAVENSWOOD AVENUE • CHICAGO 40, ILLINOIS, U. S. A.

In Canada: S&C Electric Canada, Ltd., 8 Vansco Road, Toronto 14, Ontario

POWER FUSES • DISTRIBUTION CUTOUTS AND FUSE LINKS • LOAD INTERRUPTERS • METALCLAD SWITCHGEAR

Answers to

about Kaiser Aluminum's purchase of

As part of its continuing growth program, Kaiser Aluminum & Chemical Corporation recently purchased the Wire and Cable Division of United States Rubber Co., located at Bristol, Rhode Island. The purchase raises a number of questions that are of direct interest to customers of both Kaiser Aluminum and the former Wire and Cable Division of U. S. Rubber. Here are the answers to those questions.

Q. Will all of the U.S. Rubber products still be available?

A. Yes, ALL of the wire and cable products formerly offered by U.S. Rubber will continue to be produced and sold—without changes of any kind.

Q. Who will back up the U.S. Rubber guarantees now? What about replacement?

A. Kaiser Aluminum will guarantee all U.S. Rubber Wire and Cable Division products now in use on the same terms as originally established, including replacement. Former U.S. Rubber products (which will continue to be offered) will carry the same guarantees as before.

Q. I have always liked the way U.S. Rubber people have served my needs; who will be doing the job now?

A. The same people who served you before will serve you now. The purchase includes acquisition of Wire and Cable Division's nationwide sales organization, as well as the plant work force of 1200 people.

Q. Will the price structure remain the same?

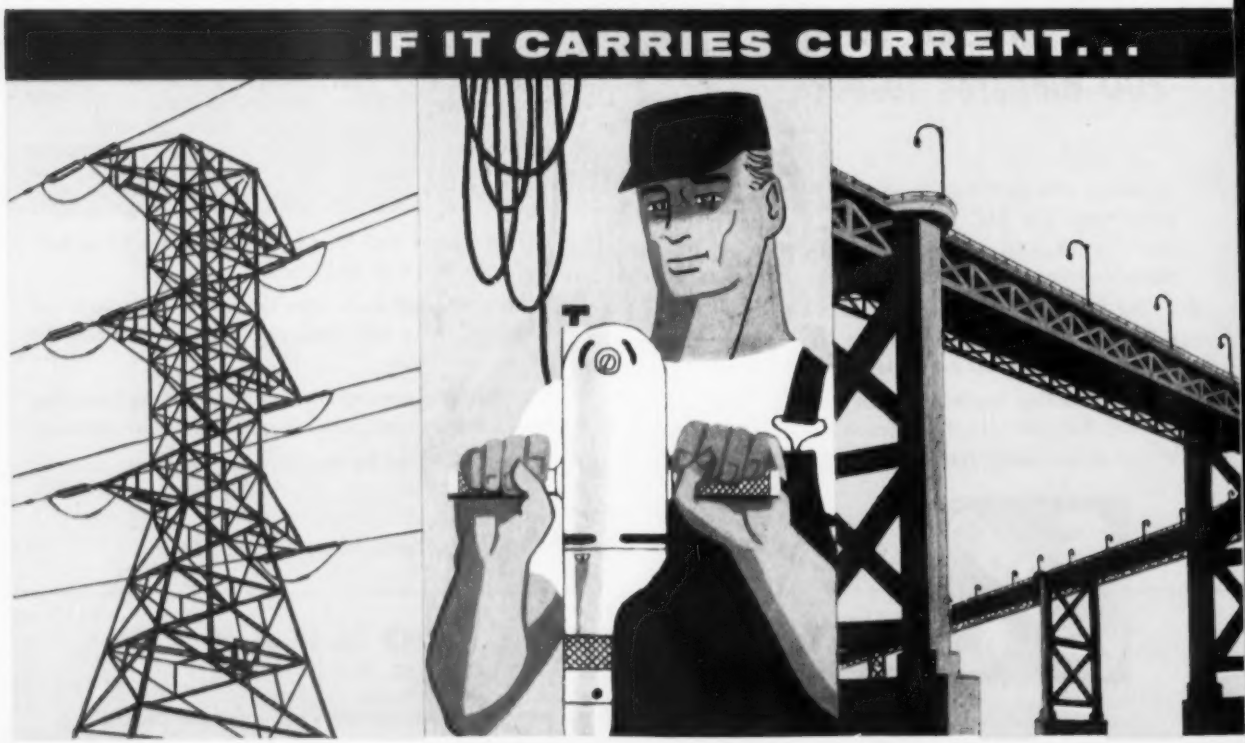
A. There will be no change in price structure as a result of the purchase. Kaiser Aluminum will continue to be a leader in maintaining a stable price structure throughout the market.

Q. Can I now buy both aluminum and copper electrical conductor from Kaiser Aluminum?

A. Yes—and in a wider variety than formerly available from either source. One of the primary effects of the purchase is to broaden the product range offered by Kaiser Aluminum in both aluminum and copper conductors.

Q. How about the insulations used in U.S. Rubber products: will the quality still be the same?

A. These high-quality insulations will remain exactly the same in every specification detail. In fact, they will be *supplied* by U.S. Rubber. Continued research cooperation will exist between the U.S. Rubber scientists and engineers and Kaiser Aluminum.



your questions

U. S. Rubber Wire and Cable Division

Q. Will new people from both companies be calling on me?

A. There will be no duplication of calls, because former U.S. Rubber personnel will be prepared to present the entire, broadened product line to those customers who can benefit by it. Occasionally, Kaiser Aluminum specialists will accompany the former U.S. Rubber representatives to help present the complete line. Conversely, Kaiser Aluminum Sales Representatives will be prepared to present the new, complete line to their established customers, assisted by former U.S. Rubber specialists.

Q. I formerly bought through a Kaiser Aluminum or U.S. Rubber distributor outlet. How will this be changed?

A. The distributor who formerly carried U.S. Rubber wire and cable will continue to offer the same products with no change. Present Kaiser Aluminum Distributor outlets also will remain unchanged.

Q. Will there be any effect on the Field Engineering Services formerly available through either company?

A. The technical assistance available to you will be greatly increased. Kaiser Aluminum—as the nation's largest producer of covered aluminum wire—is already a leader in research and product development, both in the laboratory and in the field. Now, by acquiring additional highly skilled technical personnel, these services will be further strengthened.

Q. How will the new setup affect my delivery date?

A. The convenience of a new eastern plant location, plus additional sales representatives and distributors, will mean even faster and more efficient service.

* * *

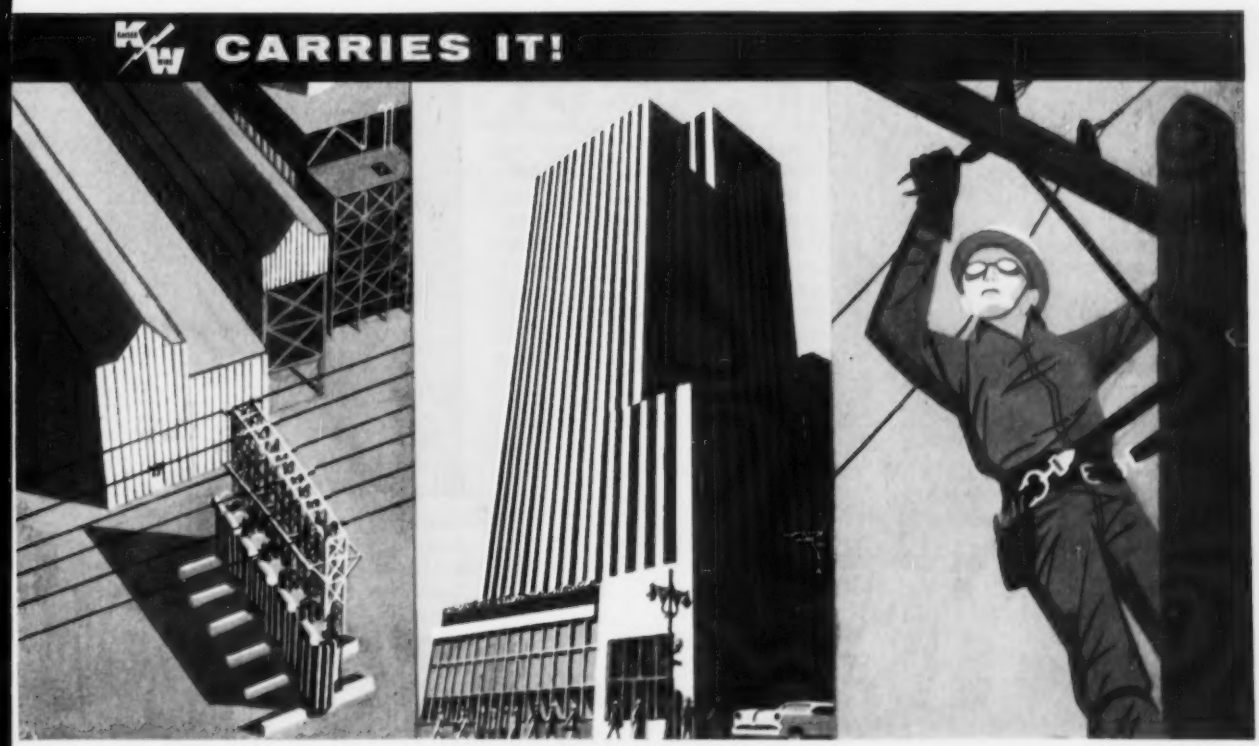
The purchase of the Wire and Cable Division of United States Rubber puts into operation the twenty-third plant for Kaiser Aluminum, which started with three plants just ten years ago.

This growth is based on the continued support of our customers, who, working with us, have helped to make Kaiser Aluminum the nation's fastest-growing major producer of aluminum. This latest acquisition represents another step forward in our program of complete service to the nation's rapidly-expanding electrical industry.

Kaiser Aluminum & Chemical Sales, Inc., *Executive Office*, Kaiser Bldg., Oakland 12, California; *General Sales Office*, Palmolive Bldg., Chicago 11, Illinois.

Kaiser Aluminum

See "THE KAISER ALUMINUM HOUR," Alternate Tuesdays, NBC Network. Consult your local TV listing.



IES Regional Meetings

General pattern of the three regional conferences of the Illuminating Engineering Society in the West has been announced, although final confirmation from speakers has delayed final details. President N. M. Waterman of Westinghouse Lamp Division, Bloomfield, will address all three on IES progress and affairs. Other headquarters staff members too will contribute to each conference, as will a leading figure from each of the major lamp companies and national manufacturers. Available details of each conference follow:

Pacific Northwest

With Kenneth Reid, City of Victoria, as regional vice-president the Pacific Northwest IES regional conference will begin March 28, at the Empress Hotel, Victoria, B.C. Registration and a cocktail party March 27 evening will precede it. The conference committees under C. J. Roper, conference chairman, have scheduled half of the "My Most Interesting Lighting Job" contest Thursday afternoon after a morning session featuring "Trends in School Lighting" by Willard Allphin, Sylvania Electric Products, Salem, Mass. After a tea break in the afternoon "Trends in Design of Residential Luminaries" will be discussed by H. Goldstein, Westinghouse Lighting Division, Montreal.

"Lighting the New B. C. Electric Building, Vancouver" will be described at the opening Friday session by M. A. Thoams, consulting engineer, and T. H. Doherty, B. C. Electric Co. A special feature of Western and regional interest will be "Current Practice in Sawmill Lighting" presented by Prof. Dan Finch, University of California. A panel discussion of the subject will follow, moderated by D. S. Gordon, B. C. Electric Co. The balance of the MMIL.J contest will be run off in the afternoon with the winners from each section and chapter participating. The banquet for the president will be that night.

A concluding Saturday morning session will start with "The History of Street Lighting in Victoria" by Ken Reid, electrical engineer, City of Victoria and regional vice-president. "Recent Lamp and Light Source Developments for Street Lighting" will be given by E. B. Karns, Westinghouse Electric Corp., Cleveland. "Color in Light and Lighting" will conclude the conference, being presented by Charles N. Clark, General Electric Co., Nela Park, Cleveland.

In charge of the various activities for the conference are, besides Roper and Reid: A. S. Harris, planning; W. E. Beek, secretary; R. Parker, treasurer; A. Evans, past chairman; R. Parker, finance; W. G. McIntosh, papers and program; G. Douglas, attendance and publicity; G. Langdon, registration and reception; J. Pye, properties; A. Evans, hotel; Mrs. Reid, Mrs. Harris, Mrs. Roper, ladies entertainment; T. Emes, transportation; G. Geddie, entertainment; J. Morrison, lighting contest.

South Pacific

Each of the five sessions planned for the South Pacific regional conference at Hotel Statler, Los Angeles, April 3-5, will be specialized on one field of lighting. While the speakers have not been announced the pattern has been outlined by William Shalda, Shalda Mfg. Co. conference chairman. Audie Ashcraft, Southern California Edison Co., vice-chairman and Roy Jones, Westinghouse Lamp Division, papers and program chairman. Carleton Thompson, San Diego Gas & Electric Co., is regional vice-president.

The conference proper opens Wednesday afternoon after morning registration with an address by a prominent industrialist. The MMIL.J contest will then be conducted between chapter winners.

"Effect of Illumination on Production" will be the opening technical session topic Thursday morning, under Guy de Leuze, chairman, Golden Gate Section. "Visual Comfort and Illumination" will be next presented. A description of several outstanding California lighting installations will next be presented, such as that at Douglas and Helipot.

"How To Get Your Money's Worth in Lighting Equipment" may prove a provocative topic at the afternoon session, under G. S. Kimball, chairman, San Diego chapter. "Maintenance of Lighting Installations" is also scheduled and perhaps "Unusual Lighting Techniques."

Street lighting will be the Friday morning subject. M. P. Fenton, chairman, Mother Lode Chapter, will preside. Following a coffee break floodlighting of buildings and parking areas will be covered. New light sources will then be shown. After the President's luncheon, at which M. N. Waterman will speak, the afternoon session will be on color and residential lighting, with George Baker, San Jose chapter, presiding. Committeemen in charge of various phases of the conference were listed in last month's issue, p 142.

Intermountain

The Alvarado Hotel, not the Hilton as previously announced, is where the Intermountain regional conference of IES will be held, April 11-12. Stanley Bazant Jr. is conference chairman and Carl R. Albach, vice-chairman and in charge of papers and program. Regional vice-president is Jerry Whitnell, Arizona Public Service Co., Phoenix. Details of the program had not been received at press time. It was only known that William A. Cyr, ELECTRICAL WEST consulting editor, was scheduled as banquet speaker. His topic: "Research Projects Needed—But Good."

Other committeemen in charge of various aspects of the conference are: Robert J. Uhl, executive committee chairman; Robert Detzler, vice-chairman, also hotel and transportation; Robert King, honorary vice-chairman; and Fred Dunn, secretary-treasurer and finances; E. T. McGillan, registration and reception; Joe Pearce, entertainment; Bud Boehning, MMIL.J contest; Joe Lopez, attendance and publicity; Gerald Joseph, decorations; and LaVerne Knudtson, ladies.

New president of the Santa Clara-San Benito Chapter of NECA, Paul Leslie, All-Cal Electric Co., San Jose, and George A. Harter, energetic chapter manager, are tying in their chapter strongly with National Electrical Week and the Live Better . . . Electrically program. Harter was chairman of the Electric Week committee for the county. Housepower was strongly promoted

GENERAL ELECTRIC ML-32 STEP VOLTAGE REGULATORS on the line at the substation of a large midwestern utility.

Midwest Utility Finds That General Electric ML-32 Voltage Regulators Require

"PRACTICALLY NO MAINTENANCE"

By Bob Bry, Manager—Marketing Voltage Regulator Product Section

A large midwest electric utility has been installing a great many of our ML-32 step voltage regulators. We asked them why, and here is what they told us:

One of their Division Superintendents said: "I like the ML-32 from the maintenance point of view. There is practically no maintenance as compared with other types or makes of regulation. I feel we save time and money because it isn't as necessary to continually check the G-E regulators."

He feels that big dollar savings have resulted for his company because "installation of the G-E regulators has cut down on the number of maintenance trips we've had to make to outlying areas and the oil field sections."

Another reason for this utility's preference for ML-32 regulators is the G-E Load Bonus which allows them to increase current capacity while the regulator is energized.

Another one of their Division Superintendents put it this way: "I especially like the ML-32's Load Bonus feature because, in cases where the load builds up and exceeds the regulator rating, we can use Load Bonus to obtain a capacity of 160%. In other words, in cases where the load builds up, we set the taps up on the transformer and set the regulator to boost 5% and buck 10%."

Reduced maintenance costs and increased current capacity can save your company money, too. Learn more about this new G-E regulator by asking your G-E representative or by writing Section 423-22, General Electric Co., Schenectady 5, N. Y.

Progress Is Our Most Important Product

GENERAL ELECTRIC

New officers of the Intermountain Electrical Assn.: seated left to right, De Lamar Holt, president; Leo A. Hansen Jr., vice-president. Standing, J. R. Christensen, secretary-treasurer; Robert O. Trottier, managing director

IEA Elects New Officers

De Lamar Holt, veteran employee of Utah Power & Light Co., has been named president of the Intermountain Electrical Assn., succeeding Ernest D. Schettler, Modern Electric Co., Salt Lake City.

Other officers for the year are Leo A. Hansen Jr., vice-president, and J. R. Christensen, secretary-treasurer. Robert O. Trottier was re-elected managing director.

With 330 member firms and eight chapters in Utah and Idaho, IEA has planned a campaign for substantial enlargement of membership, Trottier said. It also has scheduled an aggressive personal contact program to acquaint the public with the dangers of inadequate wiring. A speakers' bureau, with J. C. Jacobs, Apex Electric Co., Salt Lake City, as chairman, has been organized to take the wiring story before civic, religious and educational groups.

Date for the association's annual convention has been set for March 22 at Ben Lomond, Ogden, Utah. Convention committee chairman is Carl Edvalson, who heads the Ogden retail chapter of IEA. Although the convention program is still being whipped into shape, a principal speaker will be F. M. Falge, San Francisco, director of the Live Better . . . *Electrically* program in eight Western states.

Meetings Scheduled 'til July

March

7—**San Diego Bureau of Home Appliances,** spring conference, House of Hospitality, Balboa Park, San Diego

18-20—**Canadian Electrical Assn.,** Western Zone meeting, Hotel Vancouver, Vancouver, B. C.

22—**Intermountain Electrical Assn.,** annual conference, Ogden, Utah.

21-23—**Pacific Coast Electrical Assn.,** Engineering & Operating Section, Statler Hotel, Los Angeles.

28-29—**Illuminating Engineering Society,** Pacific Northwest region annual conference, Empress Hotel, Victoria, B. C.

29—**NAED** area meeting, Disneyland Hotel, Anaheim

April

3-5—**Northwest Public Power Assn.,** annual membership meeting, Benjamin Franklin Hotel, Seattle.

3-5—**IES,** South Pacific Coast region annual conference, Statler Hotel, Los Angeles

11-12—**IES,** Intermountain region annual conference, Alvarado Hotel, Albuquerque, N. M.

12-13—**IAEI,** Nevada Chapter annual meeting.

15—**IAEI,** Utah Chapter annual meeting, Salt Lake City

17—**IAEI,** Idaho Chapter annual meeting, Boise.

16-18—**Electrical Maintenance Engineers Assn.** of Southern California, biennial conference, University of Southern California.

19-20—**International Association of Electrical Inspectors,** Montana Chapter annual meeting

21-24—**Rocky Mountain Electric League,** spring conference, Shirley Savoy Hotel, Denver

23-24—**NPPA,** Engineering & Operations Section, Tacoma Utility Center and Winthrop Hotel, Tacoma.

24-25—**PCEA,** Administrative Services Section, La Playa Hotel, Carmel, Calif.

24-26—**Northwest Electric Light & Power Assn.,** Engineering & Operating Section, Sun Valley, Idaho.

May

6-8—**NELPA,** Business Development Section, Vancouver, B. C.

15-17—**PCEA** annual convention, Fairmont Hotel, San Francisco

20-22—**National Electrical Contractors Assn.,** annual District 6, 8 and 9 conference, Multnomah Hotel, Portland

20-24—**National Fire Prevention Assn.,** national convention, Los Angeles

June

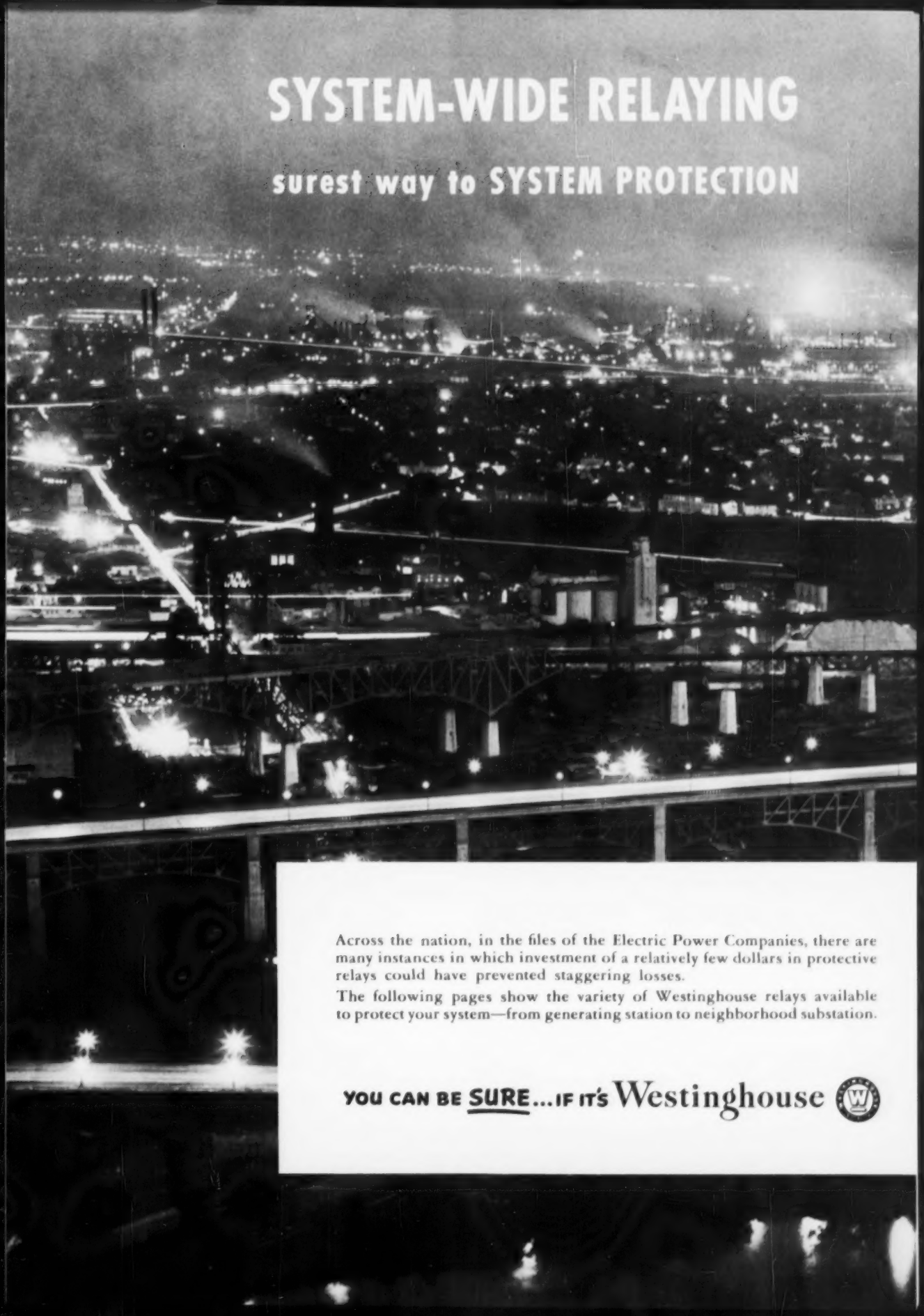
11-13—**Western Plant Maintenance Show,** Civic Auditorium, San Francisco

20-22—**NELPA,** Accounting & Business Practice Section, Sun Valley

—**NAED,** second group of area meetings (dates and places not yet determined)

—**Los Angeles Home Show,** Los Angeles

• The Electrical Maintenance Engineers Assn. of Southern California has selected Charles H. Hays of Electrical Estimators as their new president for 1957. He succeeds Carl L. Ladenberger of Southern California Edison. Serving this year with Hays are: first vice-president, Harry D. Huff of American Pipe & Construction Co.; second vice-president, Henry R. Schumacher, Richfield Oil Corp.; and secretary-treasurer, Robert J. Kernaghan, Goodyear Tire & Rubber Co. The association, which has 1,000 members, also elected three members to three-year terms on the executive committee. They are: Paul H. Henrichs, Southern California Edison; Charles M. Tabor, Larsen-Hogue Electric Co.; and Frank R. Tharp, Floodlight & Fluorescent Maintenance Co. Both officers and committee members were installed at the Feb. 20 monthly meeting.



Across the nation, in the files of the Electric Power Companies, there are many instances in which investment of a relatively few dollars in protective relays could have prevented staggering losses.

The following pages show the variety of Westinghouse relays available to protect your system—from generating station to neighborhood substation.

YOU CAN BE SURE... IF IT'S Westinghouse

Optimum station relaying

. . . early warning plus emergency stop for "protection in depth"

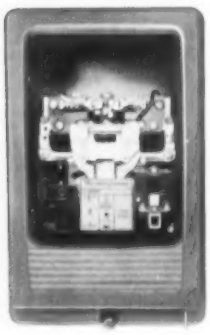
Any fault in a generator, bus or power transformer is real trouble—but adequate detection, early warning and reliable tripping can minimize equipment damage and prevent complete replacement . . . with brief outages rather than extended ones. Advance warning of impending trouble is often just as important as clearing faulted apparatus from the system. The key to optimum protection is "defense in depth."

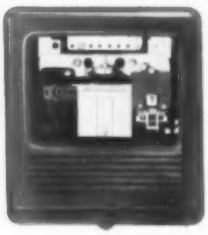
Below is a representative group of Westinghouse relays for generating stations. They incorporate the unparalleled design for performance and reliability that has made Westinghouse the unquestioned leader in the field. Housed in Flexitest* cases, they give you greater accessibility for maintenance and testing—simple interchangeability. Your Westinghouse sales office has complete information.

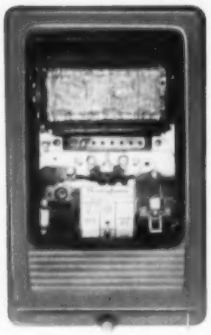
*Trade-Mark

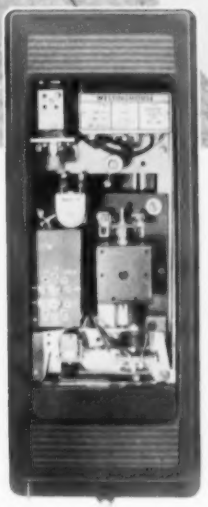
YOU CAN BE SURE...IF IT'S

Westinghouse









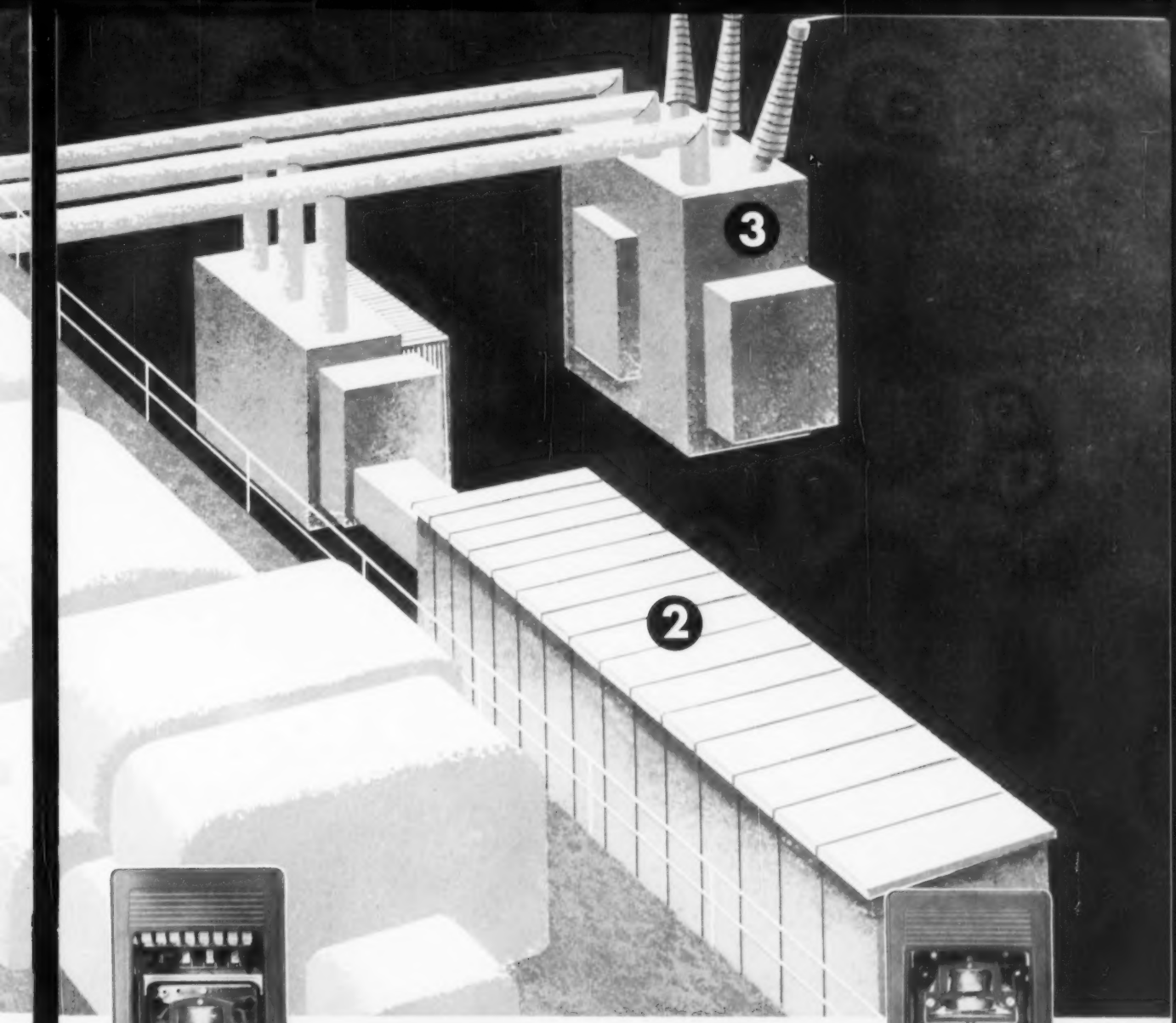
1

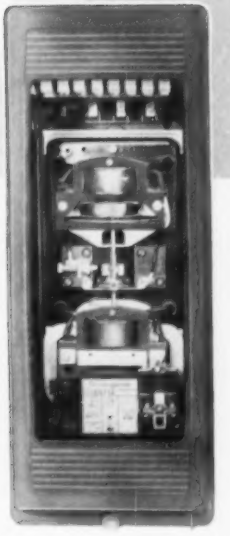
CA—Generator Differential Relay—Basic generator protection for phase and ground faults. It initiates tripping of turbine throttle, main breaker, field breaker—and application of CO_2 extinguishers, if they are used.

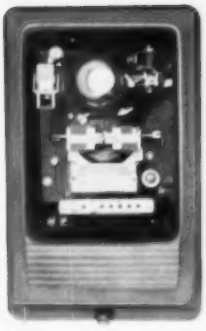
CV-8—Sensitive Generator Ground-Fault Protection—This relay will warn the operator or trip breakers, as you choose. It serves as early detection of minor faults—warns or acts before serious damage can occur. It has self-contained third harmonic filter.

COQ—Generator Negative Sequence Relay—This unit sounds alarm or trips breakers in the event of unbalanced system conditions which could result in generator damage due to rotor overheating.

HLF—Generator Loss of Field Relay—This device sounds an alarm when the machine operates too far into the leading power-factor region and trips the generator breakers in the presence of low terminal voltage due to partial or complete loss of field.



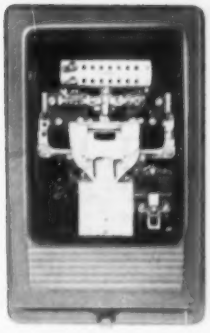


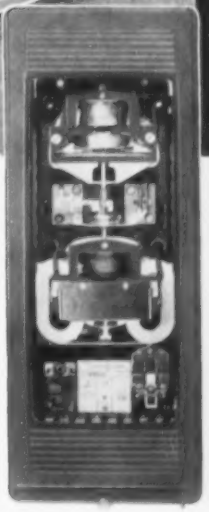


2

CA-6—Bus Differential Relay —Basic protection against phase or ground faults on major buses. It trips all generator and line breakers associated with the faulted bus section.

LC—Linear Coupler Bus Differential Relay — High-speed, extra-sensitive, relay to trip all generator and line breakers associated with faulted bus section. Air-core design of linear coupler eliminates errors of current transformer iron saturation.





3

CA—Transformer Differential Relay—This unit detects faults in transformer bushings and transformer windings. The action provides fast tripping of all associated breakers. The unit employs self-contained current balancing taps.

CA-4—Three-Winding Transformer Differential Relay —This specialized unit offers the same protection for three-winding transformers as does the CA for two-winding transformers.

Transmission protection by carrier relaying

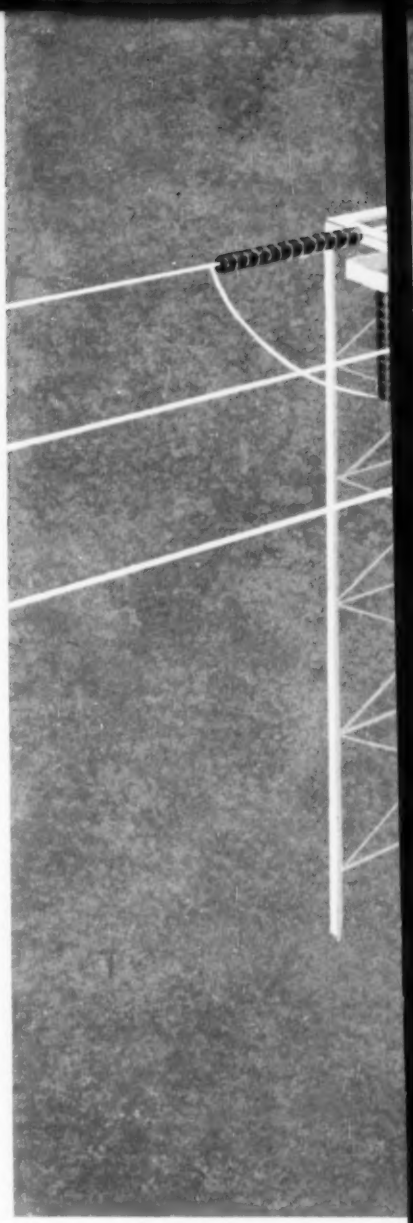
. . . assured continuity and stability through simultaneous tripping and isolation of faulted section

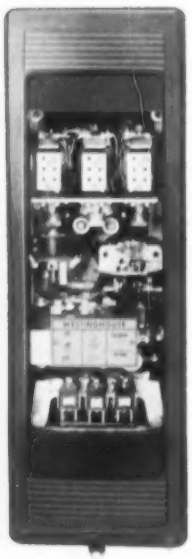
Isolation and location of faulted transmission line sections, with the least possible disturbance to the system, can reach its greatest effectiveness only through comparative intelligence which will allow simultaneous tripping and high-speed reclosing at both ends of faulted line sections.

Westinghouse directional-distance carrier relaying provides the ultimate in high-speed protection of transmission lines — and in flexibility of application.

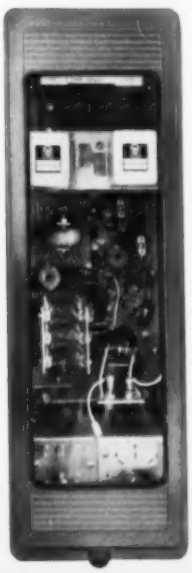
The comparative intelligence coordination is provided by carrier relaying of the Type KR for most applications. For lines with unusually high attenuation or noise level, frequency shift carrier or special anti-noise equipments can be used to provide efficient and dependable service.

This page illustrates HZ, HZ-4 and HZM relays which can be carrier coordinated — including frequency-shift applications. Complete application information and specifications are available from your Westinghouse sales office — or from Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.



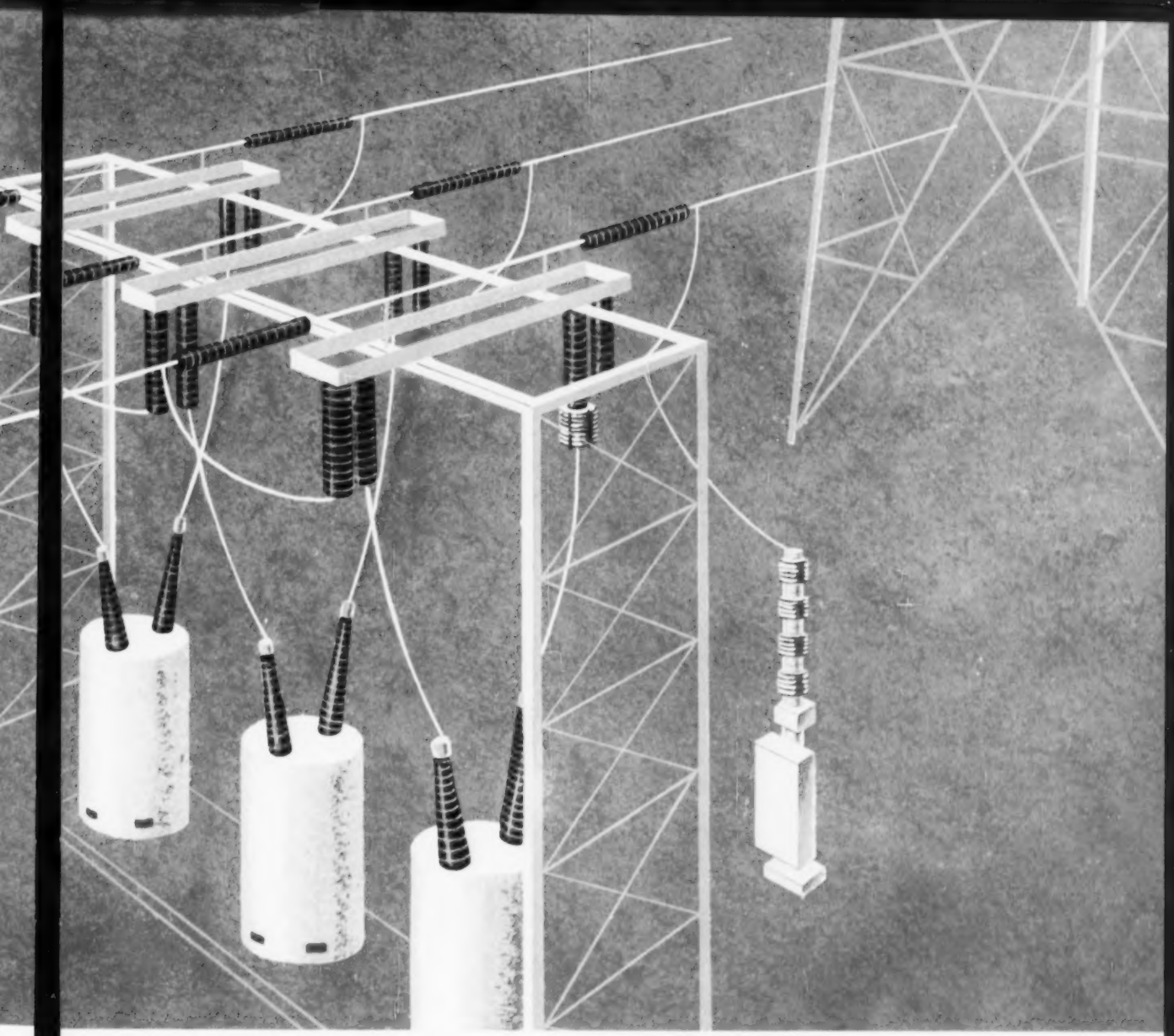


Type HZ (at left) is the basic directional-distance relay for high-speed protection of transmission lines. Type HZ-4, not shown, but similar in appearance, is a high-speed, sensitive, directional-distance unit especially suited to heavily loaded short lines where phase angle discrimination is necessary between load and fault impedance in the third zone. Type HZM, also similar in appearance, is the best and most efficient, flexible protection for long-line and high angle-line application.



YOU CAN BE SURE... IF IT'S

Westinghouse



COMPLETELY TRANSISTORIZED CARRIER

The All-New Type KR

Ever since "miracle" transistors were announced a few years ago, everyone has agreed that they would revolutionize the application of electronics . . . They have done just that to Westinghouse power line carrier.

Tested since 1953 under regular utility service conditions, Type KR carrier has been in regular commercial service since June, 1955. Here's what the testing under actual service conditions has proved:

1. It has all the advantages of the Westinghouse carrier you have been using — PLUS —
2. Cuts your maintenance costs—because of the extreme long life of transistors.
3. Uses no floor space at all — Flexitest* case mounted compared with conventional 18 cubic foot cubicle construction.
4. Cuts your battery system requirements — from 250 watts to less than 25 watts per set.
5. Printed circuits, plug connectors, Flexitest case mounting, simplified adjustment and greatly improved selectivity — provides rugged stability and additional channel possibilities.

Complete details are yours for the asking at your nearby Westinghouse sales office. Ask about Microwave, too. It will implement your present system if you need more channels — give you a big advantage in rough terrain.

*Trademark

Distribution relaying upgrades service . . . gives top protection, too

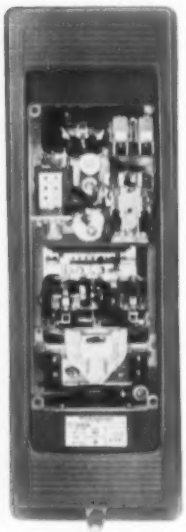
It's epidemic! Growing pains in distribution systems. If space is at a premium in your substations—and it undoubtedly is—then new CO and CR relays, reduced in size by one-third, offer you a big advantage. You can use them in modernization programs—revision of old systems into reconnected loop systems. You gain in space required—eight relays where only five could be accommodated before. And, in addition, you gain the Flexitest case features—including chassis pull-out test facilities and strap connections to eliminate the maze of wires.

The basic relays are the CO (overcurrent) and the CR (directional overcurrent). In addition, the HRZ is available where a high-speed distance unit with timed back-up is particularly important.

Incidentally, space-saving, important as it is, is not the whole story. Talk to your Westinghouse relay specialist about the improved operating characteristics, lower burdens and other features of the completely redesigned series of overcurrent and directional relays.

Type CO overcurrent relay.

Type CR directional overcurrent relay.



HRZ —High-Speed Protection Coordinated With Existing Low-Speed Relays

High-speed phase protection for 90% of a line section plus inverse time backup is available in HRZ directional overcurrent impedance relays. This relay is ideally suited for subtransmission lines where it is often desirable to provide high-speed protection and effective coordination with induction disc relays on adjacent line sections of the system.

YOU CAN BE SURE...IF IT'S

Westinghouse

This engineering team can beat trouble to the draw

Today's—and tomorrow's—fantastic appetite for and dependence on electric energy makes prolonged system outages and extensive equipment damage more intolerable than ever. *Planned* system relaying meets the problem head-on.

Minimizing equipment damage and system disturbance is accomplished only when system design and relay application are a coordinated effort. This requires close cooperation between the system planning engineer, the transmission and distribution engineer and the relay engineer. The Westinghouse relay and system engineers can also be valuable additions to the coordination team. These men can operate with outstanding effectiveness in the prime interest of the Electric Power Company—adequately protecting a tremendous capital investment—and insuring the optimum in customer service.

CP 1039

YOU CAN BE **SURE**...IF IT'S

Westinghouse

THIS MONTH'S NEWS

Partnership on Trinity Approved by Secretary

Partnership on California's Trinity River reclamation project has received the approval of Interior Secretary Fred Seaton.

Pacific Gas and Electric Co. had proposed building and operating power generating features of the project and paying the government for falling water. This is the proposition that was approved by Seaton as he made his recommendation to Congress.

Seaton said congressional approval of partnership would save the government $55,500,000 in the cost of the project. He said an all-federal project would cost $225,000,000.

Seaton reported:

"In my opinion, it appears clear that joint development would provide substantially more funds for potential irrigation and multi-purpose development in the Central Valley.

"This means the power resources of the Trinity River division under joint development would provide the greater benefit to the project area and to the nation as a whole.

"I am also conscious of the fact that the basic purpose of the reclamation program is the development of irrigation water supply and the reclamation of land. Electric power is generated as an incident to the basic purposes.

"It seems to me the development of the power resources of the Trinity River division under a joint proposal would mean power would become a better partner of irrigation development than under all-federal development."

New Power Pool Formed In Texas-New Mexico

The El Paso Electric Co. has signed an agreement with the Bureau of Reclamation and three other utilities providing for a pool-type operation for the power system of the Rio Grande Reclamation project, according to W. V. Holik, president.

The power pool agreement, to run for 25 years, culminates nearly three years of negotiations by the utility with the Bureau of Reclamation, the Community Public Service Co., the Plains Electric Generation and Transmission Cooperative, and the Public Service Co. of New Mexico.

The pooling arrangement provides a way of firming up power needs of the Rio Grande project customers during dry years and will provide a market for surplus energy from Elephant Butte during years of peak flow in the Rio Grande.

The pool relieves the United States of purchasing power and energy to make up the deficiencies of the Rio Grande project due to shortages of water and at the same time provides an over-all plan of operation for the benefit of customers and the five power agencies forming the pool.

● The Cowlitz County PUD of Longview, Wash., has retained a second financial firm to assist in arranging funds for its $16,000,000 Swift No. 2 hydroelectric project on the Lewis River. Smith, Barney & Co. of New York and Chicago is made an equal partner with the Seattle firm of Foster & Marshall in financial arrangements for the dam.

Nearly 22,000 lamps are in the new headquarters building of British Columbia Electric Co. at Vancouver, and make this brilliant display when they are turned on at night. With 18 of the 21 stories completed, the $7,000,000 building requires close to 1,800 kva. The headquarters have been three years under construction under the supervision of Tom Ingledow, BCE vice-president and executive engineer

full 90° bend with one stroke of the ram . . . easy portability . . . extra versatility

Here's the kind of real portability you've been looking for in a bender for ½" to 2" pipe and conduit. Using light, but strong, aluminum alloy for many parts, the new GREENLEE No. 880 Hydraulic Bender is unusually *lightweight*, yet extra rugged, fast, powerful . . . produces 15 tons of ram force! One man can easily carry and operate it to quickly make uniform bends. Complete 90° bends can be made with one ram stroke. Separate two-speed hydraulic hand pump and bending ram simplify handling and setup. Easily operated by hand or may be teamed with a GREENLEE Power Pump for fast production jobs.

Attachments also available for bending thin-wall conduit, tubing, bus-bars. Get complete details on how to speed jobs and get better results with the new GREENLEE No. 880 Bender. Write for Bulletin E-217.

GREENLEE

GREENLEE TOOL CO.

1763 Columbia Ave., Rockford, Illinois

Luminescent Scotchlite signs on line trucks tell the world how the crew assigned to the truck is doing on its safety record in a practice started by Pacific Power & Light Co. Green Reddy Kilowatts with the legend "All's Well" mean the crew has had no accidents for the month. Reddy on crutches against a red background means a crew member has had a time lost accident. Safety Director Fons Hughes places a sign as (from left) A. E. Boytana, Herman Glenz, Charles Boling, Charles Moore, George Jones and Silas Yeager look on. Signs are on every vehicle of the company

California to Contest Supreme Court Decision

State Attorney General Edmund G. Brown of California intends to petition the state supreme court for a rehearing of the Ivanhoe Irrigation District. The court ruled federal reclamation bureau contracts with 160-acre limitation clauses are invalid.

"We feel the implications of the decision are far reaching and its effect on the development of California water law will be tremendous," Brown stated. The attorney general had taken the position of 160-acre contracts are valid under California law.

Seattle Readies System For New Equipment

The Seattle City Council has been asked for a $1,800,000 appropriation by Seattle City Light for additional equipment to provide power for two 100-ton electric furnaces to be placed in operation about Jan. 1 next year by Bethlehem Pacific Coast Steel Corp.

Paul J. Raver, City Light superintendent, said that the Bethlehem contract will be the largest single industrial power contract ever negotiated by the municipal utility. Each of the furnaces is rated at 25,000 kva but, because of their operating cycle, the two will have a peak demand estimated at 37,500 kw. If they run continuously, as expected, they will use about 140,000,000 kwh annually, about 4% of present City Light sales.

Colorado Company Adding Generating Facilities

Southern Colorado Power Co., with headquarters at Pueblo, has announced plans to extend modernization of its generating plant at Canon City. D. B. Hyer Jr., president, said the addition will include a 22,000-kw steam-turbine generating plant and substation. The overall cost will be $5,000,000. The new facilities will increase the Canon City plant output to 38,500 kw.

Stearns-Roger Mfg. Co. of Denver was awarded the contract for the new construction, due for completion by May 1959. Stearns-Roger's first work, beginning in September, will be dismantling of an old 7,500-kw plant built in 1916. Stearns-Roger completed in 1955 a new 16,500-kw generating unit.

FPC Grants License for PGE's North Fork Dam

Federal Power Commission has licensed the Portland General Electric Co.'s $13,300,000 North Fork hydroelectric project on the upper Clackamas River.

The license permits PGE to build a concrete arch-type dam which will impound 7,700 acre-ft of usable storage and a power house with installed capacity of 38,400 kw.

The North Fork Dam also will permit increase of hydro generating capacity at downstream plants of the company. Preliminary work on the project already was underway on the basis of earlier permissive action by FPC and Oregon Hydroelectric Commission.

New Mexico Company Gets AEC Contract

Plans to build a $3,000,000 transmission line to supply additional power to Los Alamos Scientific Laboratory were announced recently by the Atomic Energy Commission's Albuquerque office and Public Service Co. of New Mexico.

Under a contract signed by AEC and the utility, delivery of the power to Los Alamos will begin by July 1, 1958, over a new 115,000-v line. Public Service Co. will build a line from Albuquerque to Santa Fe at a cost of more than $2,000,000; the AEC will build the rest of the line from Santa Fe to Los Alamos at a cost of about $1,000,000. Contracts are expected to be let in May.

The utility now has a 46,000-v line from Albuquerque to Santa Fe which will be supplemented by the new line.

Officials anticipate that Los Alamos' power requirements will be considerably less than the new line's capacity for several years, so the Albuquerque-Santa Fe 115,000-v line will be able to provide additional capacity for consumers in Santa Fe and Las Vegas, N. M.

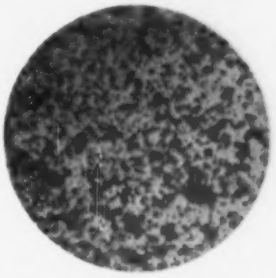
Pacific Power & Light Expanding Service Area

Pacific Power & Light Co. has asked the Wyoming Public Service Commission for authority to provide electric service to four townships in a rural area south and east of Laramie.

The territory lies adjacent to area formerly served by Western Public Service Co., which Pacific acquired more than a year ago. It is not being served by any electric utility.

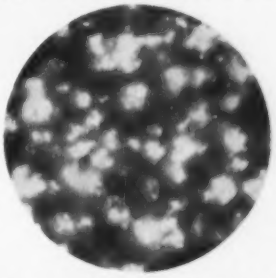
HOW SUBOX PAINTS ACTIVELY COMBAT CORROSION

Subox paints go far beyond the passive protection of inert paints. The chemically-active suboxide of lead in Subox paints actually works continuously to combat corrosion, as illustrated by these photomicrographs:



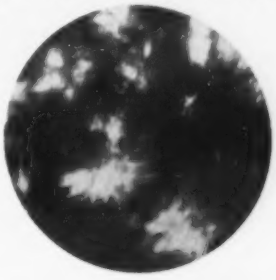
LEAD-SUBOXIDE PARTICLES

Lead-suboxide is a colloidal pigment which assures maximum penetration of a surface . . . packs to form a dense, impervious film. Two coats of Subox usually give the coverage of three of other paints . . . often, one coat of Subox is enough.



FIELD OF LEAD SOAPS

As soon as Subox is dry, lead-suboxide begins to react with the fatty acids of the vehicle to form insoluble lead soaps whose fibers bear metallic lead. These fibers intertwine to continuously build up a reinforcing film of protection.



FIBROUS STRUCTURE OF LEAD SOAPS

The fibrous film gradually strengthens and replaces the original vehicle film which otherwise would have become brittle and have largely lost its protective power and adhesion.

Subox paints are the only American paints made with lead-suboxide. They are economical to apply, endure for years and largely eliminate the need for scraping and repriming when repainting is required.

Write for the brochure "Subox Paints".

SUBOX PAINTS

Subox Inc.

Established 1924
18 Fairmount Plant
Hackensack, N. J.

Graduates of a new lineman training school jointly sponsored by Puget Sound Power & Light Co., Local 77 of IBEW and Edison Vocational School of Seattle were able to reduce the time to a journeyman's rating by six months. Each Saturday for 10 weeks the first 29 students spent four hours in a classroom and four hours on training devices to learn their trade. Neal Purdy, a Puget lineman, was technical instructor and Joe Bradshaw, Puget safety engineer, instructed in safe practices. Outside experts taught the use of tools, methods and system principles. Purdy's time was paid for by both the utility and the union local, and the utility provided the tools, transportation, insurance and other items. After completion of the training course on their own time, the men work six months before promotion

Tacoma Continues Fight To Build Cowlitz Dams

The fight by the city of Tacoma, Wash., to build a $138,000,000 hydroelectric project on the Cowlitz River moved to the Washington State Legislature Feb. 7 when the Washington State Supreme Court ruled that the city has no legal authority to condemn a fish hatchery and other state-owned property, which would be flooded by one of the two proposed dams.

One day later, a bill was filed in the state senate which would give the city power to acquire the property. The same day saw the filing of another bill which would prohibit construction of the dams.

This will be the second legislative session in recent years which has concerned itself with Tacoma's power program. When the city first was considering the Cowlitz project, sports interests obtained passage of a bill which banned construction on the river of any dam more than 25 ft high. Tacoma obtained a FPC permit for the 460,000-kw project, however, and its right to construct the dams was upheld in the courts.

The supreme court's decision was somewhat of a surprise in that it was based on right of the city to acquire state property, rather than on the question of navigability, which was given major attention in the lower courts. Dean Barline, Tacoma utilities director, said the city will file a motion for rehearing before the state supreme court to get all questions of law decided. He pointed out there were some points on which the court did not comment, including the question of navigability.

The court reached its decision by a vote of 5 to 3. The majority opinion held that "a municipal corporation or a public corporation does not have the power to condemn state-owned lands dedicated to a public use unless that power is clearly and expressly conferred upon it by statute." It further held that Tacoma did not receive this power under its FPC license.

Construction of Mayfield Dam, the first of two proposed on the Cowlitz, has been under way for more than a year but work has seriously been limited by court actions. Contracts totaling more than $15,000,000 have been awarded and Tacoma's investment in the project is estimated at $4,000,000.

The supreme court's judgment upheld a decision handed down by Judge Charles T. Wright of the Thurston County Superior Court at Olympia, but on different grounds. Wright said the project violated a 1909 law that prohibited any project that would interfere with public navigation.

San Diego Utility Plans New South Bay Section

Anticipating a continuance of the same growth pattern which has been experienced during the past 10 years in the area served by San Diego Gas & Electric Company, the board of directors recently authorized the construction of the first electric generating unit at its South Bay power plant, E. D. Sherwin, president, has announced.

Sherwin said that this first unit will have a generating capability of 135,000 kw which will be one-fourth greater than that of the largest unit now on the system.

Sherwin further stated that this unit is scheduled to be in operation in 1960. Construction will start in the latter part of 1957 and will involve a total investment of $25,000,000.

• **The California state** public utilities commission has approved Pacific Gas and Electric Co.'s acquisition of Pinole Light & Power Co., which serves the East Bay communities of Pinole and Rodeo. PG and E will issue 7,000 shares with a total par value of $175,000 in return for 200 shares in the Pinole firm.

CONTEMPORARY LIGHTING WITH AMAZING SIMPLICITY

Here's surface-mounted lighting with a big difference: the luminous, all-white SHALLORAMA.® A new Sunbeam Lighting development, it represents a never-before-achieved combination of extreme shallowness and unusual even brightness control. Designed for new or remodelled interiors, it is especially suitable to today's trend to lower ceilings. All metal components are die-formed for uniform, precision construction. The matte white, wrap-around Plexiglas is sturdily framed and has continuous hook-on ledges for opening from either side. No hooks, hinges, latches, light or dark streaks mar the sleek SHALLORAMA® beauty.

Installation is a swift and simple procedure: remove assembled fixture from carton, secure to ceiling with normal two-screw mounting, attach leads and the job is done. Don't worry about uneven ceilings either; the integral jack-type levellers assure precision alignment.

Patent Pending **SHALLORAMA a new dimension in lighting**

Write for Bulletin A-63.

SUNBEAM LIGHTING COMPANY, 777 EAST FOURTEENTH PLACE, LOS ANGELES 21, CALIFORNIA

Cleaning costs high? Save with

PULLMAN VACMOBILE

World's finest industrial vacuum cleaner

Cleaning, scrubbing, drying, dusting, polishing tools for every surface are carried with the unit.

It's all here . . . (pic. of Vacmobile) . . . Caboose carries tools and supplies.

The Vacmobile combines cleaning power with mobility never before achieved.

Covers bigger cleaning area, requires less labor. Glides over sills, carpet edges, climbs ramps and stairs—no lifting. Rolls with ease.

Featuring the patented ACCORDIAN HOSE!
Bends and stretches to over 16 feet.
Reaches awkward areas.

STANDARD KITS INCLUDE:
1. Accordian Hose; 2. Extension Wand; 3. Master Tool with slide-on adaptors; 4. Felt; 5. Brush; 6. Notched aluminum rug; 7. Handi-Tool with Slide-On; 8. Upholstery Brush.
Wet Pick-up equipment, extra. Becomes blower in seconds with quick connecting hose coupling.

Pullman
VACMOBILE

Pullman Vacuum Cleaner Corp.
25 Buick Street (E.W.-3) Boston 15, Mass.

NOW..here's new convenience!
High Capacity
UNIT TEST BLOCKS

Write for BULLETIN 81

CAT. NO. 5612
Wire Cap. No. 6 to 1/0
CAT. NO. 5622
Wire Cap. No. 2 to 4/0

Test links interchangeable with service links, duplex screws on line side, solderless lugs with new type patented wire stop, barriers suitable for either side and extend ¼" over all live parts, large mounting holes in heavy duty moulded base.

All features that insure easier, quicker installation and trouble-free performance.

METER DEVICES COMPANY
1001 Prospect Ave., S. W.
CANTON 6, OHIO

Preferred by Leading Manufacturers . . . and Best for YOUR Customers!

CORNISH

RUBBER • NEOPRENE • PLASTIC
Flexible Cords

In convenient lengths on smart lithographed metal spools for fast over-counter action. For absolute uniformity, superior electrical qualities and ultimate economy, sell 'em CORNISH . . . the BEST!

CORD SETS

For home, farm and industry now available in COLOR. Engineered and produced in modern plants . . . the BLUE CHIPS of industry, worth a push for PROFIT.

CORNISH WIRE CO., INC.
50 Church Street New York 7, N. Y.

NEWS ABOUT PEOPLE

Gray

Paul Gray Promoted At San Diego G&E

Paul A. Gray has been appointed to a new position with San Diego Gas & Electric Co. He is commercial services director, a position that includes supervision of the order, investigation and appliance repair departments.

Other appointments in the new organization include Truitt P. Richardson, who is staff assistant of the new department; Charles R. Barclay, order department supervisor; Fred J. Wright, investigation department supervisor; Alan J. McCutcheon, cooperative wiring supervisor, and Richard E. Farwell, customer extension planning supervisor, San Diego area.

• **Donald Broehl** is now resident engineer at the Pelton project of Portland General Electric Co. He replaces Larry Kelsh who is transferred to the North Fork project as resident engineer.

• **George A. Haller** has been named administrative assistant of the Fairbanks Municipal Utility System. Also promoted recently was Edward Leigh-Kendall, who is now purchasing agent. Haller is a former manager of Stevens County PUD, Wash., and former engineer of Benton County PUD. He had many years service as field engineer with Peter Kiewit & Sons and with Donald M. Drake & Co., construction contractors. Leigh-Kendall joined Fairbanks Municipal in 1954 after several years Alaska service with the Corps of Engineers.

Plymire

Davis

Davis and Plymire Get Puget Sound Promotions

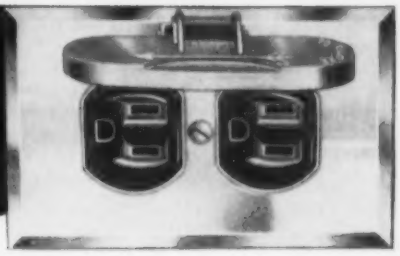
Two executive changes are announced by Puget Sound Power & Light Co. R. F. Plymire, former general commercial manager, is now a vice-president; and Ralph M. Davis, former chairman of the Washington State Public Service Commission, is now secretary of the company.

Plymire's responsibilities in the new position cover the entire revenue side of the business. He has been with the company since 1930.

Davis assumes duties formerly handled by Walter S. Zachary who recently retired.

• **Montana Power Co.** announces the transfer of three engineers. Chester Beldon, assistant division superintendent at Havre, goes to Billings as electrical engineer. His replacement is David C. Johns, transferring from Livingston where he has been assistant division superintendent. Walter Kelley, electrical engineer at Anaconda, moves to Livingston.

NEW! Exclusive! Different!



BELL SAF-T-LOK (Pat. Pend.) Weatherproof OUTLET

FEATURING *Exclusive* STAY OPEN SNAP-COVER ACTION

STAYS OPEN IN SAFETY-LOCKED POSITION

SNAPS SHUT AUTOMATICALLY WITH SLIGHT PUSH

No. 219 SINGLE SNAP-COVER PARALLEL SLOT DUPLEX RECEPTACLE

No. 220 SINGLE SNAP-COVER 3-WIRE GROUNDING DUPLEX RECEPTACLE

Grounds metal parts of portable electrical tools, lawn mowers, etc. for safety in use with *Metallic* or *Non-Metallic* wiring systems.

STOCK and SELL *FAST MOVING* BELL

...the most COMPLETE line with EXCLUSIVE selling advantages

No. 210

Exclusive SNAP-COVER locks open for easy, one-hand insertion of plug . . . yet snaps shut at a touch for weatherproof protection. Lid does not rest on wire or plug. Can't damage insulation if cord is jerked out. *Cover cannot be loosened or pulled off.*

No. 210—ONE-GANG SAF-T-LOK SINGLE RECEPTACLE

Bell—The *Complete* Line—The *Only* Line with SAF-T-LOK SNAP-COVERS OR SCREW COVERS in 1 or 2-gang Combinations.

UL

U.L. APPROVED

No. 214 Flush Screw-Cover Duplex Receptacle

No. 216 Flush Switch (Single pole, T-rated)

No. 228 Combination Flush Switch & Snap-Cover Outlet

No. 233 Flush Switch and Duplex Screw Cover Duplex Receptacle

Make BELL your one source for the best in weather-proof and No-Shok devices, and Metal Wall Plates. *Write for Catalog and Prices today!*

BELL

BELL ELECTRIC CO.

1844 West 21st Street • Chicago 8, Ill.

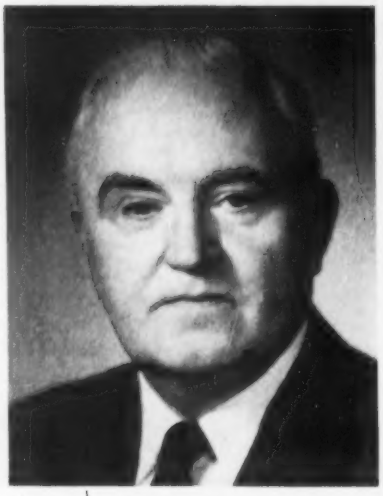
Personnel Changes Made At Portland Utility

Portland General Electric Co. has announced three personnel changes. E. A. Paine is promoted to superintendent of distribution and is to be succeeded as assistant superintendent by Scott Samsel.

Robert H. Short, former manager of public information, is now assistant to the chairman of the board of directors.

Paine has been with the company's distribution department through most of his career with the company, which started in 1917. Samsel has been with the company since 1936, and has served as assistant division superintendent of the Willamette Valley division and in the Portland division distribution department.

Short joined the company in 1955 and has had most of his service in Washington, D. C. He will continue his activities there in the new position.



Paine

Short

Vernstrom Appointed To Succeed Pearson

Ed F. Pearson has retired as head of Northwest operations of Pacific Power & Light Co., and Roy Vernstrom has been appointed to succeed him.

Vernstrom's title is assistant general manager, and Portland district is part of his executive responsibility.

Pearson is a veteran of nearly 45 years service, joining the company in 1912.

Vernstrom joined the company in 1947 as advertising manager and has served as general sales manager for the past three years.

Pearson

Vernstrom

• **Edward F. Fox** is new director of publicity for British Columbia Electric Co. He has been with the company 10 years, and has served as public relations assistant to the vice-president in charge of Vancouver Island operations. He was formerly a Victoria newspaperman. Peter C. Woodward takes over the Vancouver Island position. He has been with the company nine years, and was formerly a Victoria newspaperman.

• **Personnel changes** announced by Snohomish County PUD No. 1 include the promotion of William D. Dorway to superintendent of operations. He succeeds J. Marzluff, who retired March 1. Merle E. Roberson has the newly created job of superintendent of distribution. Ross G. Anderson replaces Roberson as assistant superintendent in charge of Everett line crews. Lloyd T. McKee takes over Dorway's former duties as distribution engineer in charge of substations.

• **Roy Torvinen** has been appointed treasurer of Sierra Pacific Power Co. to succeed H. P. Dayton who recently retired. Torvinen has been with Sierra Pacific since 1930, and in the electric utility business since 1921. He started his career as an accounting clerk with Puget Sound Power & Light Co. R. A. Holdcraft is appointed assistant treasurer to fill the vacancy created by Torvinen's promotion.

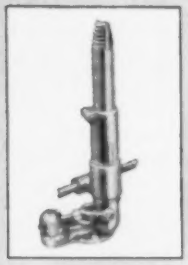
• **Harold Merilees,** public relations chief of British Columbia Electric Co., has been named head of Vancouver's Centennial Committee.

• **Harold Sallee,** manager of the Glenrock, Wyo., district of Pacific Power & Light Co., moves to Portland to head up the company's property acquisition activities in its five-state territory. His successor at Glenrock is Charles E. McQueary, an employee since 1948.

• **Mrs. Nina E. Duncan,** editor of the *Current News* of Salt River Power District, has been elected president of Arizona Industrial Editors. She succeeds Bill Luse of Arizona Public Service Co.

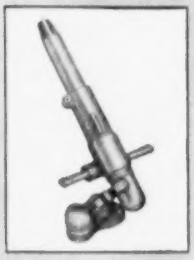
Deaths

• **David M. Salsbury,** one of the Westerners who started at the bottom in the electrical supplies wholesale business and rose to his company's presidency and who had retired back home in the West, died of heart ailment Jan. 28 while visiting Honolulu. He had retired June 30, 1954, and was living on San Juan Island in Puget Sound. He came to California in 1918, joined Electric Railway & Manufacturers Supply Co., later acquired by Westinghouse



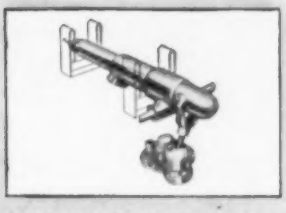
1. SWITCH BLADE IN FULLY OPEN POSITION

Universal link connects blade and crank arm for transmitting forces to the switch blade for full cycle of operation.



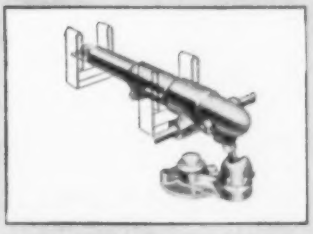
2. SWITCH BLADE CLOSING

Switch blade is moved from the open to closed position by a relatively small angular motion of the crank arm.



3. SWITCH BLADE ENTERS CONTACTS

In this position the switch blade begins its rotation for full contact engagement. Continued movement of the crank arm will rotate the blade to bring contacts under high pressure.



4. SWITCH WITH CONTACTS FULLY ENGAGED

The simple linkage of the WAG concentrates mechanical advantage so that contact engagement or disengagement is accomplished with a minimum of effort.

Simple WAG linkage boosts mechanical advantage; lessens operating effort

In one sweeping, continuous movement the Type WAG Switch blade swings into the open or closed position. There is no lost motion — no cams, triggers, or latches.

The WAG is operated by a simple system of cranks and levers arranged to transmit maximum torque when the blade rotates to engage or disengage the contacts. By concentrating mechanical advantage where it is needed most, the WAG can be operated smoothly and with less effort.

Thus, the Type WAG offers the advantages that engineers recognize as so important: a switch easy to operate, higher contact pressure, and wider contact deflection. The Type WAG has the muscle to break up heavy concentrations of ice and to operate dependably under the most adverse conditions.

For a premium quality switch capable of long, reliable service, choose the Type WAG.

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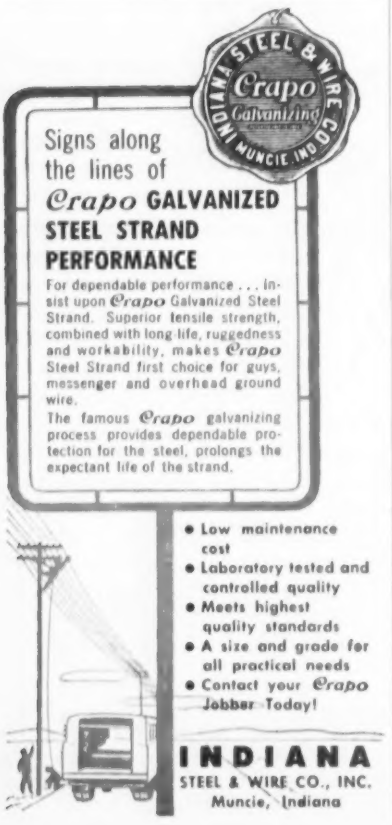
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MUNCIE, IND.
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The famous Crapo galvanizing process provides dependable protection for the steel, prolongs the expectant life of the strand.
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• Meets highest quality standards
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INDIANA
STEEL & WIRE CO., INC.
Muncie, Indiana

Electric Supply Co. He served as branch manager in Salt Lake City, North Pacific district manager in Seattle, later as president of WESCO in New York; returned to San Francisco as vice-president and Pacific Coast manager. He served as president of National Association of Electrical Distributors among many others.

• **R. J. Holtermann,** retired since 1943, a contemporary and precedent of Mr. Salsbury at Westinghouse Electric Supply, died Feb. 3 at Los Altos. Born in 1889, Mr. Holtermann started as stock clerk for California Electric Works, San Francisco, in 1905. Later, 1909, he joined Holabird Electric Co. and when it was sold to Fobes Supply in 1921 and the latter to WESCO in 1921 he managed the San Francisco house. In 1935 he was made West Coast vice-president. He retired because of health. He was an honorary member of both NAED and San Francisco Electric Club.

• **David E. Harris,** contemporary, competitor and friend of both, died Feb. 4 in San Francisco, aged 77. He had been retired since 1947. He had been president of Pacific States Electric Co., for which he had started as office boy in 1898, and when General Electric Supply Co. acquired it he served as its vice-president for the 11 Western States. In 1945 Mr. Harris was awarded the James H. McGraw medal for Cooperation because of his outstanding devotion to the improvement of the electrical industry as a team. He served as the chairman of PCEA's code and ordinance committee and was the first honorary member voted in that association. He was born in Yosemite Valley.

• **Harry Mulvany,** 68, inventor of electric controls, air heaters, high-frequency cracking of walnuts, alfalfa dehydrating and egg sandblasting equipment, died of heart ailment in Berkeley Feb. 12. After graduation from University of California in 1917 he teamed with Harry E. Kennedy in development of many agricultural and industrial devices. He at one time designed the Weir electric heater. He was a member of AIEE and ASME and is survived by three brothers also in the industry.

• **Carl J. Spain Jr.,** consulting and application engineer for the Westinghouse Electric Corp.'s Central Pacific district, died suddenly February 4 at his San Francisco home. A native of San Francisco, Mr. Spain was graduated from the University of California in 1940 with an electrical engineering degree, and joined Westinghouse at East Pittsburgh, Pa., as a graduate student. In 1942, he was transferred to Portland, Ore., as a field engineer involved in the supervision of apparatus on Navy and Merchant Marine ships. In 1946, he was appointed as a consulting and application engineer for Westinghouse, and continued in that capacity in Portland and, since 1950, in San Francisco. He was a member of American Institute of Electrical Engineers.

• **William R. Wallace,** 91, Utah's beloved "Mr. Reclamation," died Jan. 29 of an acute stomach ailment. Among his many achievements were his activities in connection with water conservation. He served as chairman of the Utah Water Storage Commission for 20 years, and was instrumental in obtaining for the state such projects as Deer Creek, Hyrum, Moon Lake and Ogden River. He was also closely associated with the Colorado River development. Many tributes by national, state, county and Salt Lake City officials were paid in honor of his many years of service to his state and country.

• **Walter J. Walsh,** electrical engineer and attorney and one of the industry's pioneers, succumbed after a cerebral hemorrhage on Jan. 4. As a boy, in 1904, he began his many years association with the electrical industry by scaling boilers for United Gas & Electric of San Jose after school. He completed a test course of General Electric Co. at Schenectady about 1909. His first engineering jobs were with Montana Power Co. during the electrification of the Milwaukee Railroad. Later he returned to San Francisco where he worked for Great Western Power Co. and studied law at the University of San Francisco. He passed the bar examination in 1926, and much of his subsequent law practice was for electrical companies. He specialized in antitrust law. He was a veteran of U. S. Navy service in Russia during World War I.

• **John H. Kangeter,** chief engineer of the Hawaiian Public Utilities Commission, died recently. He was 65. He had served with the PUC since 1936 except for World War II duty as a Navy captain in charge of civilian housing, Area III.

• **John Carey,** chief electrical inspector for the city and county of Honolulu, died in December. He served as an electrical inspector in Honolulu for 26 years and was the oldest active inspector.

IN CANADA: Dominion Cutout Co., Ltd., Toronto

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20% INCREASED OVERLOAD CAPACITY

in all new Westinghouse distribution transformers *without sacrifice of service life!* The evidence is several thousand Westinghouse transformers with increased breaker settings put on Union Electric's lines, many since 1954, without a single burnout.

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W. R. McMillan, Supt. Distribution, Union Electric Co., one of three utilities who joined Westinghouse for this major development, with Cooper Slay, St. Louis Westinghouse representative. "Higher Westinghouse transformer breaker settings have meant a decided decrease in breaker trip-outs with no loss of transformer life" . . . Mr. McMillan.

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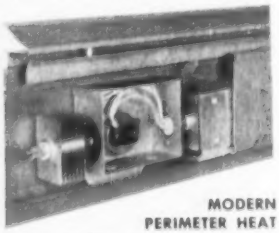
HEATSUM ELECTRIC BASEBOARD

(Illustration of cut-a-way section)



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SAFE—Low surface temperatures and safety cutout protects furniture.

2-HEAT, AUTOMATIC CONTROL — thermostat switches from high to ½ heat automatically. (Normally operates on ½ heat.)

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BASEBOARD UNITS—available in many lengths and wattages. They are designed for a completely harmonized installation in any room. Units may be joined; blank sections available for extensions.

EASY TO INSTALL—Units attach to wall surface in new or existing buildings.

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ANGLE HUBEYE BOLTS
STRAIGHT HUBEYE BOLTS
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Looking for Western Sales Representatives? Write Electrical West, 68 Post St., San Francisco, Calif.

NOTES ON THE TRADE

• **Charles O. Schmutz,** Seattle, retired Feb. 1 after 37 years with the Graybar Electric Co. and was honored by fellow employees at a banquet.

• **R. G. Baker** has been appointed operating manager at Graybar's San Bernardino facility. He joined Graybar in 1949.

• **Frank J. Hedley,** formerly with Canadian Westinghouse, has joined Johnson & Philips Ltd. as sales engineer of the switchgear, transformer and cable lines of the company. He has the British Columbia territory.

• **Al McIntosh** is a new sales representative at Vancouver, B. C., for Sylvania Electric (Canada) Ltd., lighting division.

• **Hill Transformer Co.,** 1030 Washington St., San Carlos, Calif., has acquired another building in its fourth expansion since the company was founded in 1954. The company's product line has been extended to include transformers with ratings ranging from 600 v to 69,000 v and 50 va to 5,000 kva.

• **Fabrication** and testing of compressor assemblies for the world's largest rotating machine were recently completed at the Sunnyvale division of Westinghouse. The compressors are the largest ever built, and will be driven by two 83,000-hp motors and two 25,000-hp motors. They are for an Air Force wind tunnel at Tullahoma, Tenn.

• **Fluor Corp.** announces the promotion of two executives to a newly created position of manager of projects. J. L. Tathwell, former chief project engineer, and F. G. Crawford, former manager of project coordination, will have the new title. Active contracts will be assigned to the two men for over-all management and coordination. The former titles have been discontinued.

• **Norman H. Meyers,** former sales engineer for General Electric Co. at Spokane, has been transferred to Pasco as manager of user industry sales. He replaces Gray Clifton who is transferred to Seattle.

• **David P. McCarthy, Jr.,** is now district sales representative in the Pacific Northwest territory of Yale & Towne Mfg. Co. He will handle hoist sales from offices in Seattle.

• **Darwin Seamons** has been appointed as an electrical installation and service engineer for the Denver office of General Electric's Apparatus Sales Division. He is a graduate of Utah State College, and has been with G-E since 1953. His last assignment was in Alaska.

• **Graybar Electric** Co. plans a warehouse and office building at Eugene, Ore., in the new Eugene industrial development area west of the city.

• **Zinsco Electrical Products** has acquired another building and three more building lots in Los Angeles to enlarge its switchgear division. This brings the company's facilities to a total of 200,000 sq ft.

• **Robert C. Evans** has been named sales representative in the Utah-Idaho area for the Illuminating Division, The Miller Co. He is sales manager of the Ariel Davis Supply Co., agent for the Ariel Davis Mfg. Co. in the intermountain states.

• **William R. Raymond** has been appointed to the newly created post of West Coast regional manager of Pyle-National Co. With headquarters in Los Angeles, Raymond will supervise the company's Seattle, San Francisco and Los Angeles districts.

• **Fluor** Corp. announces two executive appointments. **James D. Harris** has been elected vice-president and general counsel, and **John F. Gardner** is now vice-president in charge of employee, public relations and advertising.

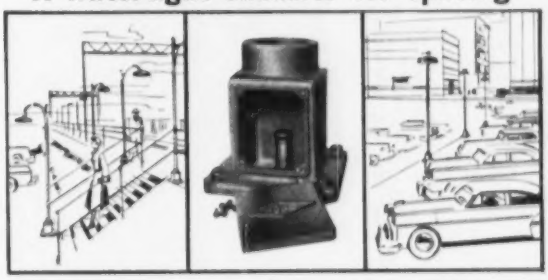
• **Don Thurman** has been elected vice-president of Ward Terry & Co. of Denver, distributing firm for RCA-Victor. Thurman, with the company nine years, will serve as a member of the board of directors and also as secretary-treasurer.

• **Lynn F. Perrott** is new Portland District sales manager for Four Wheel Drive Auto Co. He replaces **Robert J. Peterson**, recently promoted to an assistant sales manager position with FWD. Perrott's district includes Washington, Oregon, Idaho, Alaska and British Columbia.

• **S. E. Havens** has been appointed district manager of the Pacific Coast territory for Wright Hoist Division of American Chain & Cable Co. He will headquarter at 890 Tennessee St., San Francisco.

• **Continental Laboratories** Inc., Billings, will represent the Fielden Instrument Division of Robertshaw-Fulton Controls Co. in Montana, northern Idaho and northern Wyoming.

A rigid support for cut-to-length pipe
A watertight chamber for splicing



COMBINED IN THE NEW HOPE METAL-PIPE BASE for your outdoor lighting jobs! Cut Standard pipe to length—thread it to fit the Hope Metal-Pipe Base and to take the lighting fixture—and you have a complete custom-made, low-cost lighting standard. Buy the components through your electrical wholesaler—assemble them yourself—install the standards for signs, signals, platforms and plant lighting jobs. Bases made for 2", 2½", 3" and 4" pipe sizes. See your wholesaler —or write us direct.

2" — H 42200
2½" — H 42250
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40 years of brush manufacture and developed grades that give long, trouble-free life in a multitude of applications. High degree of preference and acceptance in repair shops. Send for complete literature!

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Owen

Waggoner

Waggoner Leaves West For New Hubbard Post

Hubbard & Co. has announced some executive changes involving well-known Western personnel. Raymond M. Waggoner, vice-president and general manager of Pacific Coast operations, has been elected executive vice-president of the company. He will move to Pittsburgh.

Succeeding Waggoner as head of the Pacific Coast operations is L. T. Owen, who has been district sales manager of the Mountain territory with headquarters at Boise.

Waggoner has been with Hubbard since 1922, and has held several executive positions. He came to the West Coast in 1952 as vice-president in charge of sales, and was promoted to the general manager position in August 1956.

Owen joined the company at Emeryville, Calif., in 1937, and began his sales career in the Northwest in 1946. He is inventor of the company's Drivepoint bolt.

• **Richard Deane**, electrical engineer for the West Kootenay Power & Light Co., has been appointed chief electrical engineer of the Consolidated Mining & Smelting Co., Trail, B. C.

• **John E. Kearns** is manager of a new San Francisco district sales office of the Bristol Co., Waterbury, Conn.

• **Canadian Westinghouse** has confirmed plans for a "large scale building program to enlarge its distribution facilities in British Columbia," reports George L. Wilcox, president. The expansion is to take place within a "year or so."

• **New address** of J. J. Burns, San Francisco district representative of General Electric's clock and timer department, is 1090 Bryant St.

When General Electric Supply Co. opened a new branch office and warehouse in San Jose at 735 Coleman St. on Feb. 1, it was staffed by these experienced people who proudly showed the new facility to a huge open house crowd. Left to right are C. R. Woodruff, inside sales; Phil Paul, store manager; Art Myers, counter; A. Hohl Barnes, sales manager—supplies; Russ Davenport, counter sales; and Ed F. Bargagliotti, outside sales—supplies. Henry Yoak was busy elsewhere

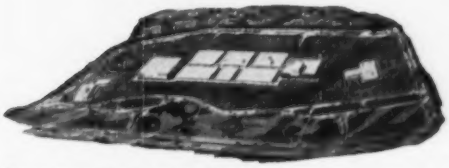
The Best Costs Less Installed

Quality Steel in Republic "INCH-MARKED" E.M.T. assures

SMOOTH BENDING

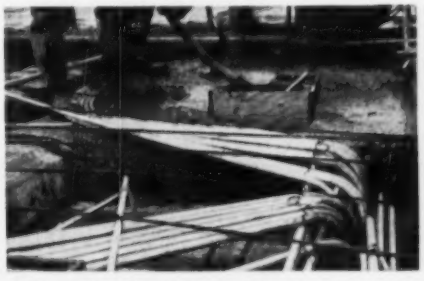
EVERY TIME!

TRUE OFFSET, BACK-TO-BACK AND SADDLE BENDS are easy to make with Republic ELECTRUNITE. Cold rolled open-hearth steel coupled with rigid manufacturing controls assure uniform ductility in every inch of tubing to make bending easy and accurate. And the special galvanized finish will not chip, flake, or peel when tube is bent.



Green Acres Shopping Center,
Valley Stream, L.I., N.Y.

Architect: Offices of Irwin S. Chanin, N. Y. C.
Electrical Contractor: Arc Electric Company, N. Y. C.



EXCELLENT FOR CONCRETE, Republic ELECTRUNITE E.M.T. is 100% approved by the National Electrical Code for concealed, exposed, and concrete-slab installations. It provides effective protection for all electrical circuits, call systems, and television leads from moisture, fire and mechanical injury. Millions of feet have been installed successfully in every conceivable type of concrete installation.

REPUBLIC STEEL CORPORATION
Steel and Tubes Division
216 East 131st Street, Cleveland 8, Ohio
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Company_____
Address_____
City_____ Zone____ State_____
C-2960-A

No worries from costly kinks, says electrical contractor on big Long Island shopping center job

"We discovered that not all electrical raceways have the *uniform ductility* of Republic ELECTRUNITE® E.M.T. This smooth-bending feature makes our job easier; practically eliminates waste."

One reason lies in the quality Republic steel used in the manufacture of ELECTRUNITE E.M.T. Republic's own ore is converted to iron, open-hearth refined into steel, and cold rolled to precise tolerances. The raceway is then formed and welded by Republic's famous ELECTRUNITE process. From start to finish every step is quality controlled to assure complete ductility and uniformity.

Arc Electric Company, electrical contractor on the huge Green Acres Shopping Center at Valley Stream, Long Island, is typical of leading contractors all over the country who have found Republic ELECTRUNITE E.M.T. both easy and economical to install.

Measuring distance is easier because the entire length of raceway is "INCH-MARKED"® in *feet* and *inches.* Bends are easier to make accurately—and without costly "wows"—due to the handy, longitudinal "GUIDE-LINE." And wire pulling or pushing is easier because of the knurled "ball-bearing" inside surface of the raceway. All are Republic exclusives.

Take a tip from successful electrical contractors and install Republic ELECTRUNITE E.M.T. on your next job. Just ask your electrical distributor for the raceway that's "INCH-MARKED" and "GUIDE-LINED" and prove to yourself why the *best* costs *less* installed. For additional information, send coupon.

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World's Widest Range of Standard Steels and Steel Products

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PROFILES

Power load dispatchers from Nevada, California and Arizona visited Agua Fria plant of Salt River Power District during a meeting of the Southwest section of the American Power Dispatchers Assn. Load Dispatchers John T. Morcom, Salt River District; Clark H. Jackson and B. P. Bengtsson, both with Los Angeles Department of Water & Power discuss Agua Fria panelboard

More than 1,000,000 man-hours of work have been completed by employees of the Bureau of Tests & Inspection of Pacific Gas and Electric Co. W. N. Lindblad, center, now retired, accepted a company citation from Vice-president G. A. Peers, left, and EEI citation from PG and E Safety Engineer Warren Hyde

John Albi, Seattle City Light safety supervisor, holds a plaque earned for his contributions to industry safety. Award was by the Washington State Department of Labor & Industry. From left are: Paul J. Raver, City Light superintendent; Ed Sorger, Labor & Industry; Ira Cottom, and John Nelson, assistants to Raver

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For years businessmen have known that light, used ingeniously on a store front, "sells" hard long after the help have gone home.

Now, with more and more stores staying open evenings, a well-lighted store front is more important than ever. *And* your chances for profitable re-lighting jobs — better than ever!

New techniques and new lamps and fixtures offer a flexibility and brilliance never before possible. Today's store front lighting job can be interesting *and* lucrative for the electrical contractor.

If you'd like a closer look at this field, P. G. and E. lighting engineers will be glad to supply up-to-date information.

P·G and E· *Pacific Gas and Electric Company*

You do a lot better when you pull together

Whatever your role in this Electric Age—you have one basic selling problem: to convince others they can "Live Better... Electrically"

But you're not alone. The electric industry is investing millions to promote the "Live Better... Electrically" idea. On television. On radio. In national magazines. In newspapers all over the country. The industry will do better – and so will you – if we all pull together. Here's how:

Whenever and wherever you contact the public, promote the "Live Better... Electrically" slogan.

Feature the slogan – and the idea – in all your ads. Spread the word on your letterheads, invoices, mailing pieces and in your house organ. Your PCEA headquarters can tell you how to obtain "Live Better... Electrically" materials.

Write your PCEA headquarters today! It's just good sense – and good business.

PACIFIC COAST ELECTRICAL ASSOCIATION

530 West Sixth Street, Los Angeles 14, California • 681 Market Street, San Francisco 5, California

LIVE BETTER ELECTRICALLY